CHRYSLER 1940-51 (Cont.)

of rear shaft mounting bolt hole center-line. Start both bushings on shaft, use lubricant such as tapping compound and turn bushings in until bushing shoulders contact faces of control arms (bushings will cut own thread in control arm bosses), tighten bushings with 165 ft. lb. force. Remove tool and make certain that shaft pivots freely in arms.

Knuckle Support Lower Pivot Pin & Bushings—Pin should be inserted through rear arm and is locked by nut and cotter pin on forward arm. To assemble control arm and knuckle support, see that bushing installed in knuckle support with head toward rear, position knuckle support between control arms so that distance from rear face of support to rear face of support pin boss on rear arm is exactly 15/16" (Chrysler Six, DeSoto, Dodge, Plymouth except 7 Pass. Sedans), 1 1/32" (Chrysler Eights and all 7 Passenger Sedans).

SPRINGS: Springs used on Chrysler Six, DeSoto, Dodge, Plymouth (except 7 Pass. Sedans) do not have lower end coil ground flat and must be installed with spring end fitted into recess formed in lower spring seat (frame height will be incorrect if spring not properly installed). On Chrysler Eights and on all 7 Pass. Sedans, both ends of springs are ground flat and lower spring seat is also flat. When installing springs on all cars, see that silencer installed on lower end of all springs (in spring seat), and on upper end of spring (in seat in cross-member). If spacers used, these should be installed between upper end of spring and upper silencer.

Spring Identification Note—Part number stamped on all springs (last digit of number indicated by like number of grind marks).

1940 SPRING SPECIFICATIONS

Car Model	Spring Part No.
Chrysler C25 Royal	857304
Chrysler C25 Windsor	857305
Chrysler C25 18" Wheels (Com'l & Ext. Duty)	860073
Chrysler C25 7 Pass. & Limo. only	674534
Chrysler C26 Traveler	861069
Chrysler C26 New Yorker & Saratoga	861070
Chrysler C26 Comm'l. & Extreme Duty	860075
Chrysler C26 Exp. (Imp.—no Fluid Drive)	861070
Chrysler C27 Crown Imperial	854758
De Soto S7	857303
De Soto S7 Comm'l. & Extreme Duty	860073
De Soto 7 Pass. & Limo. only	674533
Dodge D14, 17	857302
Dodge D14, 17 18" Whls. (Comm'l & Ext. Duty)	860072
Dodge D14 7 Pass. & Limo. only	674533
Dodge D14 7 Pass. & Limo. (Comm'l & Ex. Duty)	860074
Plymouth P9, 10	857301
Plymouth P9, 10 18" or 20" Wheels	860071
Plymouth P9, 10 Comm'l. & Extreme Duty	860071
Plymouth P10 7 Pass. & Limo. only	674532

NOTE—Part No. 657770 spacer used on driver's side of car when Commercial (Comm'l.) or Extreme (Ext.) Duty springs installed.

1941 SPRING SPECIFICATIONS

Car Model	Chrysler Models	Part No.
C28S Royal Std.		857305
C28W Windsor Std.		857306
C28 7 Pass. & Limo. only		674532
C28 18" Whls., Comm'l. & Extreme Duty		860073①
C30 Std.		674534
C30 Comm'l. & Extreme Duty		860074
C33 Std.		852957
C33 Comm'l. & Extreme Duty		861113
DeSoto Models		
S8 Std.		864844
S8 7 Pass. & Limo. only		674532
S8 18" Whls., Comm'l. & Extreme Duty		860073①
Dodge Models		
D19 Std.②		864843
D19 4 door Sedan③		864844
Plymouth Models		
P11, P12 Std.		864842
P12 7 Pass. Std.		674531
P11, P12 (18" Wheels)		860071
P12 7 Pass. (18" Whls.)		860073

①—When this spring installed to replace Std. Spring No. 857305 or 857306 (Chrysler), 857306 (DeSoto), following parts must be installed also: #691144 Lower Spring Silencer (2 used), #691144 Upper Spring Silencer (2 used), #633295 Spacer (driver's side only), #859665 Lower Control Arm (right), #859666 Lower Control Arm (left).

②—Including 4 door Sedans before Serial No. 30,345,250.

③—4 door Sedans only after Serial No. 30,345,250.

1942 SPRING SPECIFICATIONS

Car Model	Chrysler Models	Part No.
C34 Std.		674532
C34 7 Pass. & Limo.		674534
C34 Extreme & Comm'l. Duty		957004
C34 7 Pass. Extreme & Comm'l.		860074
C36 Std.		852871
C36 Extreme & Comm'l. Duty		860075
C37 Std.		854758
C37 Extreme & Comm'l. Duty		861113
De Soto Models		
S10 Std.		674532
S10 7 Pass. & Limo.		674534
S10 Extreme & Comm'l. Duty		957003
Dodge Models		
D22 Std.		864844
D22 Std. with 18" Wheels		860072
D22 Extreme & Comm'l. Duty (18" Wheels)		957003
Plymouth Models		
P14 Std.		864843
P14 Std. with 18" Wheels		860071
P14 Extreme & Comm'l. Duty (18" Wheels)		957001

Spring Silencer—No. 691144 (All Models—Upper & Lower) except No. 854105 Lower Silencer used on Dodge & Plymouth models with Std. spring.

Spacer—No. 633295 used on driver's side of car on all models.

1946-48 SPRING SPECIFICATIONS

Car Model	Chrysler Models	⑧Part No.
C38 exc. 7 Pass. & Limo.①		⑨956773
C38 exc. 7 Pass. & Limo.②		1115444
C38 7 Pass. & Limo.①③		1123625
C38 7 Pass. & Limo.②		957005
C39 exc. Convertibles①③		1123625
C39②		957005
C39 Convertibles④③		1123625
C39 Convertibles⑤		1125025
C40		1125026
De Soto Models		
S11 First Cars exc. 7 Pass. & Limo.⑥		⑨956772
S11 RIGHT SIDE exc. 7 Pass. & Limo.⑦		956772
S11 LEFT SIDE exc. 7 Pass. & Limo.⑦		⑩956773
S11 exc. 7 Pass. & Limo.②		1115444
S11 7 Pass., Limo., Sub. Sedan①		1123624
S11 7 Pass., Limo., Sub. Sedan②		957005
Car Model	**Dodge Models**	**⑧Part No.**
D24 exc. 7 Pass. & Limo.①		864845
D24 exc. 7 Pass. & Limo.②		1115443
D24 7 Pass. & Limo.①		1115433
D24 7 Pass. & Limo.②		1115445
Plymouth Models		
P15 Std. Service		⑨1115244
P15 Extreme Duty & Comm'l.		1115441

①—Standard service. ②—Extreme Duty & Comm'l.

③—When replacing a spring on cars before Serial No. 70,020,626 (C38S), 70,539,294 (C38W), 6,765,652 (C39K), 7,029,641 (C39N), 7,400,509 (Town & Country), replace both front springs.

④—C39 Convertible Coupe up to Serial 7,051,679 & C39 Town & Country Conv. up to No. 7,403,744.

⑤—C39 Convertibles after above Serial Nos.

⑥—Up to Serial No. 6,171,445 (S11S), 5,820,938 (S11C).

⑦—S11S & S11C after above Serial Nos.

⑧—With Spacer No. 657770 on driver's side only and Silencer No. 691144 (Upper), 854105 (Lower). On springs with lower end ground flat, use Spacer No. 691144 at top and bottom.

⑨—Include No. 657770 Spacer with spring for left side of car.

⑩—Spacer No. 657770 not used with this spring.

1949 SPRING SPECIFICATIONS

Car Model	Chrysler Models	Part No.
C45S,W 4-Dr. Sdn. & Club Coupe①		1134312
Above Models②	(RH) 1318185, (LH)	1318186
C45 Convertible③		1140283
C45 Convertible④		1140286
C45 Convertible⑤	(RH) 1140283, (LH)	1140284
C45 7-Pass. & Limo.		1139007
C45 Station Wagon	(RH) 1141014, (LH)	1141015
C45 Heavy Duty (4-Dr., Coupe, Convt.)		1141016
C45 Heavy Duty (7-Pass. & Limo.)		1138944
C46 4-Dr. Sdn. & Club Coupe⑥		1127985
C46 4-Dr. Sdn. & Club Coupe⑦		1127983
C46 Convt. & T&C. Convt.⑧		1134324
C46 Convt. & T&C. Convt.⑨		1139007
C46 T&C. Club Coupe		1127983
C46 Heavy Duty (4-Dr., Coupe, T&C.)		1138943
C46 Heavy Duty (Convt. & T&C. Convt.)		1138944
C47	1134327 (Std.),	1138947 (H.D.)
1949 DeSoto Models		
S13 4-Dr. Sdn. & Club Coupe		1141014
S13 Club Coupe Comm'l & H.D.		1141015
S13 7-Pass., Comm'l & H.D.		1138943
S13 Station Wagon		1141015
S13 Convertible		1134313
1949 Dodge Models		
D29 & D30 4-Dr. Sdn., D30 Club Coupe		864845
D29 & D30 4-Dr., Club Coupe Comm'l & H.D.		1139002
D30 Convertible		1134312
D30 Comm'l & H.D., D30 Sta. Wgn.		1141014
D30 7-Pass.		1140286
1949 Plymouth Models		
All	1123244 (Std.),	1139001 (H.D.)

①—Before No. (C45S) 70045592 (C45W) 70747768.

②—After above Serial Numbers.

③—Before Serial No. 70737891.

④—Serial No. 70737891 to 70748355.

⑤—After Serial No. 70748355.

⑥—Before No. (C46K) 6772870, (C46N) 7071928.

⑦—After above Serial Numbers.

⑧—Before No. (Convt.) 7102223, (T&C) 7410003.

⑨—After above Serial Numbers.

CONTINUED ON NEXT PAGE

CHRYSLER 1940-51 (Cont.)

1950 SPRING SPECIFICATIONS

1950 Chrysler Models

Car Model	Left	Right
C48 Sedan & Club Coupe	1318187	1318186
C48 Spec. Club Coupe & Convt.	1140284	1140283
C48 Station Wagon	1140284	1140283
C48 7 Pass. Models	1127983	1127983
C49 All Models	1127983	1127983
C50 All Models	1134324	1134324

1950 DeSoto Models

S14 Sedan, Club Coupe, Carryall	1318186	1318185
S14 Spec. Club Coupe & Convt.	1140283	1140283
S14 Station Wagon	1140283	1140283
S14 7 Pass. Sedan	1127983	1127981
S14 7 Pass. Suburban	1138943	1138942

1950 Dodge Models

D33	1123243	1123242
D34 Sedan & Club Coupe	864845	864844
D34 Spec. Club Coupe & Convt.	1318185	1318185
D34 Station Wagon	1318185	1318185
D34 7 Pass. Sedan	1127981	1127981

1950 Plymouth Models

P19 exc. Suburban	1123242	1123241
P19 Suburban (15" Whls)	1123243	1123242
P20 exc. Convt.	1123244	1123243
P20 Convt. Coupe	1123244	1123244

1951 SPRING SPECIFICATIONS

1951 Chrysler Models

C51 Sedan & Club Coupe	1318186	1318185
C51 Spec. Club Coupe & Convt.	1140283	1140282
C51 Station Wagon	1140283	1140282
C51 Heavy Duty on above	1141016	1141015
C51 8 Pass. & Limo. Std.	1127984	1127983
C51 8 Pass. & Limo. H.D.	1138944	1138943
C52 Sedan & Club Coupe	1127983	1127982
C52 Spec. Club Coupe & Convt.	1127984	1127983
C53 All Models	1134324	1134323
C54 All Models	1127984	1127983
C52 & C54 Heavy Duty	1138944	1138943
C53 Heavy Duty	1138945	1138945

1951 De Soto Models

S15 Sedan, Club Coupe, Carryall	1318185	1318184
S15 Spec. Club Coupe & Convt.	1140282	1140282
S15 Station Wagon	1140282	1140282
S15 Heavy Duty on above	1141016	1141015
S15 8 Pass. Sedan	1127983	1127982
S15 Suburban	1138942	1138942
S15 8 Pass. & Subn. H.D.	1138944	1138943

1951 Dodge Models

D41 Std.	1123242	1123241
D41 Heavy Duty	1139002	1139001
D42 Sedan & Club Coupe	864844	864843
D42 Spec. Club Cpe. & Sta. Wgn.	1318184	1318184
D42 Heavy Duty on above	1141014	1141013
D42 8 Pass. Sedan	1127982	1127981
D42 8 Pass. Heavy Duty	1138943	1138942

1951 Plymouth Models

P22 exc. Subn. with 18" Whls.	1123241	1123241
P22 Heavy Duty on above	1139001	1139001
P22 Suburban with 18" Whls.	1139001	1139001
P23 except Convt.	1123243	1123242
P23 Convt.	1123244	1123243
P23 Heavy Duty	1139002	1139001

1949-51 FORD PASS. CARS, LINCOLN & MERCURY

Ford 6 Cyl. & V8 Pass. Cars (1949-51)
Lincoln & Cosmopolitan Models (1949-51)
Mercury V8 Models (1949-51)

►CHANGES, CAUTIONS, CORRECTIONS

►**FORD PARTS PRODUCTION CHANGE & NEW FRONT END SPECIFICATIONS:** Ford cars after March 1, 1949 have new design IDLER ARM BRACKET and PITMAN ARM which require new Front End Specifications (Toe-In) as listed below.

►***CAUTION—These new design parts must be used together. Under no circumstances should the new and old design parts be used together on the same car.***

►**New Parts Identification:** Can be distinguished by differences in dimensions when compared with old design parts as follows:

New Idler Arm Bracket No. 8A-3351-C. Supersedes old design bracket 8A-3351-B. New design bracket is **longer** (5¼" overall changed from 5 1/16"), **thinner** (5/16" thick changed from 3/8"), and has nut at lower mounting hole (old design had capscrew thread at this mounting hole).

New Pitman Arm No. 8A-3590-B. Supersedes old design arm No. 8A-3590-A. New design arm has **greater offset** of ½" between flat surfaces of the bolt holes in the ends of the arm (changed from 3/16" offset of old design).

►**New Front End Specifications:** New Toe-In setting required for all cars with new design parts as listed above. ***See Camber, Caster, and Toe-In data following.***

►**FORD FRONT SUSPENSION NOISE CORRECTION: Popping Noise (when brakes applied) or chucking noise in Front End** may be caused by incorrect Caster Adjustment resulting in caster adjusting bushing striking lower support arm.
See Caster Adjustment instructions.

►**FORD RIDING HEIGHT & CAR LEVELING CORRECTION:** Incorrect height or list to one side may be caused by use of unmatched springs or incorrect spring height. ***Check Spring Height (see "Spring Height") and springs (see "Spring") following for specifications and correction procedure.***

►**MERCURY FRONT SPRING PRODUCTION CHANGE:** Springs changed after first 2600 cars as follows:

First 2600 Cars—Spring Part No. 8M-5310-A with **two No. 8M-5355 wax-impregnated paper shims** installed on top of spring to raise front end of car.

After 2600 Cars—Spring Part No. 8M-5310-C used. This spring is longer and **no paper shims needed.**

►***SPRING REPLACEMENT CAUTION—When using 8M-5310-C spring to replace 8M-5310-A, remove and discard the paper shims. It is not necessary to replace both front springs (8M-5310-C and 8M-5310-A with two 8M-5355 shims can be used together).***

►**FORD, LINCOLN, MERCURY FRONT SPRING PRODUCTION CHANGES:** ***See Spring data below.***

►**FORD STABILIZER ASSEMBLY PRODUCTION CHANGE 1950**—New design, and can be installed on 1949 cars. ***See Front Stabilizer data below.***

DESCRIPTION

DESCRIPTION: Independent, linked parallelogram type with coil springs and independent shock absorbers. Suspension system is made up of the following units:

CHECKING & ADJUSTMENT: First check wheel bearing adjustment, wheel spindle wear, tire inflation pressure (see data below), wheel **run-out** and balance (run-out should not exceed ⅛"), steering linkage and steering gear for excessive looseness or play, then **place car on level floor and check front** end specifications with car at curb weight as follows:

Tire Inflation Pressure: For each tire size (Cold):
Ford 6.00x16—Front 28 lbs., Rear 25 lbs.
Ford 6.70x15—Front 24 lbs., Rear 21 lbs.
Ford Sta. Wagon 7.10x15 6 Ply—Front 25 lbs., Rear 30 lbs.
Mercury 7.10x15 4 Ply—Front & Rear 24 lbs.
Mercury Sta. Wagon 7.10x15 6 Ply—Front & Rear 30 lbs.
Lincoln 8.20x15—Front & Rear 24 lbs.

Ford Riding Height (Frame Height at Curb Weight): Before checking front end specifications, check frame height on level floor at curb weight (full tank of fuel but no passenger load) as follows:

Front End Height—Lightly jounce **rear** end of car several times to allow car to assume natural position. Measure from floor to center of lower support arm pivot pins at inner and outer ends of arm on each side of car. Height at inner end of arm should be ⅛" to 1" greater than height at outer end. **If inner end ⅛" greater to ¼" less than outer end,** install shim on spring (see Springs). **If inner end more than ¼" less than outer end,** replace spring (see Springs).

Rear End Height—Lightly jounce **front** end of car several times to allow car to assume natural position. Measure vertical distance from top of axle inner "U" bolt to underside of frame alongside bumper on each side of car (see "Frame Height" in table below). If distance not correct, check for correct spring (Part No. stamped on bottom of shortest leaf under clip plate) and replace spring if it has developed a "set".

Rear Frame Height

Model	Frame Height	Spring No.
3-Pass. Coupe	4 7/8"-6 1/16"	8A-5560-B
5 Pass. Coupe & Sedans	5 7/8"-7 3/8"	8A-5560-D
Convertible	5½"-7"	8A-5560-D
Station Wagon	7 7/8"-7 3/8"	8A-5560-F

Lincoln & Mercury Riding Height: With car at curb weight, measure distance from floor to center of lower control arm pivot pins at inner and outer ends of arm. Height at outer end of arm should be 1" less than at inner end of arm and measurement should be same on both sides of car. If distance not correct, or unequal, correct by shimming or replacing springs (see Springs).

Kingpin Inclination:
(Ford)—5¼° crosswise.
(Lincoln & Mercury)—5° with ¾° camber.

Camber: (Ford) Pos. ¼° to Pos. ¾° preferred (limits 0° to Pos. 1°) with maximum variation between wheels of ¼°.
(Lincoln & Mercury)—0° to Pos. ¾° with maximum variation between wheels of ¼°.

►***FORD CAMBER NOTE—Above specifications correct for old and new design parts (see Ford Production Change Note) and supersede earlier specifications.***

Adjustment—Must be made exactly as follows to avoid possibility of binding and noise in front suspension system (as stated in Noise Correction Note above):

1) Back off clampscrew in **upper** end of spindle support one turn to free the bushing.
2) Install tool No. 3046-N on hexagonal head of bushing in **upper end** of spindle support, use wrench engaging boss on tool to turn bushing for desired camber.

CONTINUED ON NEXT PAGE

1949-51 FORD, LINCOLN, MERCURY (Continued)

3) See that support is against shoulder on bushing. When making minimum or maximum camber adjustment, back bushing off slightly to permit free-floating of clampscrew in groove in bushing.

4) Tighten clampscrew to 25-32 ft. lbs.

►*CAUTION—Clampscrew must not bind on side of groove in bushing (will prevent bushing being held securely and kept from moving in service).*

NOTE—Bushing is eccentric and entire range of adjustment should be secured within ½ turn.

►*CAUTION—If correct setting not obtained within range of camber bushing movement (½ turn), check all suspension parts for misalignment or wear.*

Caster: (Ford exc. Sta. Wgn.) Pos. ½° to Neg. 1° with maximum variation between wheels of ½°.

(Ford Station Wagon) Neg. ¼° preferred (limits Neg. ¼° to Neg. 1¾°) with maximum variation between wheels of ½°.

(Lincoln & Mercury) Pos. ½° to Neg. 1° with maximum variation between wheels of ½°.

►*FORD CASTER NOTE—Above specifications correct for old & new design parts (see Ford Production Change Note) and supersede earlier specifications.*

Adjustment—Must be made exactly as follows to avoid possibility of binding and noise in front suspension system (as stated in Noise Correction Note above):

1) Back off clampscrew in lower end of spindle support one turn to free the bushing.

2) Install tool No. 3089-N on hexagonal head of bushing in lower end of spindle support, use wrench engaging boss on tool to turn bushing for desired caster.

3) See that support is against shoulder on bushing and that clearance between bushing and arm is at least .045" (if bushing strikes arm when making maximum caster adjustment, back off bushing a minimum of ½ revolution for above clearance).

4) Tighten clampscrew to 25-32 ft. lbs.

►*CAUTION—Clampscrew must not bind on side of groove in bushing (binding will prevent clampscrew gripping bushing securely to prevent movement of bushing when screw tightened to recommended 25-32 ft. lbs.).*

►*CAUTION—If correct setting not obtained within range of caster bushing movement (⅛" either way), check all suspension parts for misalignment or wear.*

►**Toe-In:** *CAUTION—Two settings used on Ford as follows:*

Ford (With Old Design Parts—Before Mar. 1, 1949) 1/8" **Toe-out** to 3/16" **Toe-out.**

Ford (With New Design Parts—After Mar. 1, 1949) 1/16" **Toe-in** to 1/8" **Toe-in.**

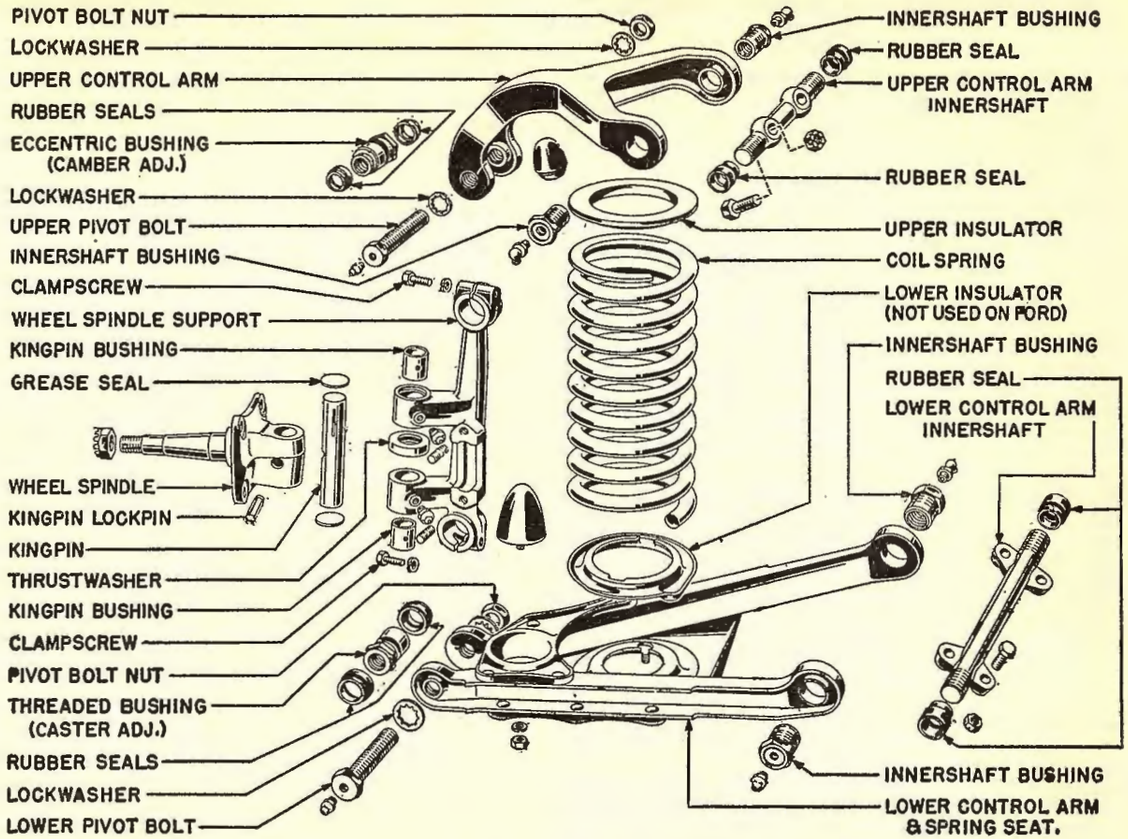
Lincoln & Mercury—3/32" to 5/32" Toe-in.

►*FORD TOE-IN CAUTION—Correct setting must be used for cars with OLD and NEW design parts (as listed in Ford Production Change Note). Settings listed above supersede earlier specifications.*

Adjustment—With steering wheel turned to center position and with both front wheels positioned "straight-ahead", loosen clamp bolts on adjusting sleeve at outer end of each tie rod, **turn both adjusting sleeves equally to set toe-in.**

►*FORD ADJUSTMENT NOTE*—If steering wheel spoke not horizontal with wheels "straight-ahead," shorten one tie rod and lengthen opposite rod to align steering wheel and adjust toe-in.

Steering Geometry (Toe-out on Turns): On Lincoln & Mercury, with outer wheel turned exactly 20°, inner wheel should be turned 23½° ± ½°. No adjustment provided. Check suspension system for bent parts if incorrect.



FORD, LINCOLN, MERCURY FRONT SUSPENSION

Ford Front Stabilizer: New design clamped directly to each lower control arm at two points (no frame connection).

Removal & Installation—Take out two stabilizer retainer-to-control arm bolts on each arm, remove retainers, lift stabilizer assembly off, slide insulators off stabilizer bar. When assembling stabilzer, use hydraulic brake fluid on insulators when sliding insulators on bar.

►**Installing 1950-51 Stabilizer on 1949 Cars**—Remove and discard old stabilizer. Drill .32" hole (#11 drill) in web of each lower arm assembly at point .78" up from lower face of arm and 7/8" out from outer face of lower spring seat flange. Position stabilizer on lower control arms with **offset upward** (to provide clearance), make certain that projections on clamps engage drilled holes in arms and that clamp bolts are at top. Install outer retainers with bolt hole at the bottom.

SHOCK ABSORBER REPLACEMENT: *Not necessary to disturb front suspension assembly.* **Remove two cap**screws (Ford), nuts on two mounting studs (Lincoln & Mercury) which hold **shock absorber mounting** plate on underside of **spring seat on lower control** arm. Remove nut on mounting stud **at upper end** of shock absorber, lower unit through hole in **spring** seat.

COIL SPRING REPLACEMENT: Support **car on jack** under frame. Remove shock absorber (**see above**). Disconnect stabilizer by removing **end clip. Use a** jack under the lower control arm inner shaft to hold shaft against cross-member, take out four mounting bolts in shaft. Lower jack slowly until spring tension is relieved, with spring fully extended, lift spring out. Install spring in same manner. See that flat end of spring is up, install insulator on top of spring (all models), and bottom of spring (Lincoln & Mercury only). Make certain that bottom of spring is properly seated in recess in spring seat on lower control arm. See "Springs" (below) for specifications.

LOWER CONTROL ARM REPLACEMENT: Remove coil spring (see above), remove nut on bolt linking control arm to wheel spindle support, unscrew bolt from arm and support bushing. Install arm in same manner. Hold support and bushing assembly centered in control arm while screwing bolt through bushing. Install new rubber seals on bolt (each side of support).

CONTINUED ON NEXT PAGE

1949-51 FORD, LINCOLN, MERCURY (Continued)

►**Lincoln & Mercury Lower Support Arm Frame Mounting Bolt Nut Change**—Nuts on bolts mounting inner shaft on frame were MARSDEN type (Part No. 34397-S) on first cars and **should be changed to** HUGLOCK type (Part No. 34447-S) whenever found in service.

UPPER CONTROL ARM REPLACEMENT: Raise car with a jack under the lower control arm spring seat. Remove wheel. Wire upper end of wheel spindle support to frame (to avoid movement of the support and damage to brake line when arm removed). Remove two capscrews mounting pivot shaft at inner end of control arm on frame. Remove nut on bolt linking upper arm to upper end of wheel spindle support, unscrew bolt from arm and support bushing, lift arm out. Install control arm in same manner. Hold support and bushing assembly centered in control arm while screwing bolt through bushing. Install new rubber seals on bolt (each side of support).

WHEEL SPINDLE SUPPORT REPLACEMENT: Raise car with a jack under the lower control arm spring seat. Remove wheel and brake drum assembly. Take out mounting bolts in backing plate, hang backing plate up on frame (to avoid disconnecting brake line). Drive out kingpin locking pin. Pry out grease seal plug in support above kingpin, drive kingpin down and out of support and wheel spindle (pin will force out lower grease seal plug). Remove nuts on bolts at upper and lower ends of support, unscrew bolts from control arms and support bushings. Lift out support. Bushings can be removed from support by removing clampscrew and pressing bushings out. Install support in same manner.

KINGPIN BUSHING REPLACEMENT: Bushings can be replaced without removing wheel spindle support from the car. Remove wheel spindle (see Wheel Spindle Support Removal), press old bushings out, press new bushings in and ream bushings to size listed below.

Kingpin Bushing—Maximum inside diameter of new bushings: (Ford) .8125-.8135", (Lincoln & Mercury) .9380-.9385". Wear limit inside diameter of old bushings: (Ford) .8185", (Lincoln & Mercury) .9435". **Kingpin**—Maximum diameter of new kingpin: (Ford) .8115-.8120", (Lincoln & Mercury) .9365-.9370". Wear limit diameter of old kingpin: (Ford) .8170", (Lincoln & Mercury) .942".

Kingpin Clearance in Bushing—New limits (Ford) .0005-.002", (Lincoln & Mercury) .001-.002". Worn limits .009" for all models.

SPRINGS: Springs have upper end ground flat and are marked for identification as follows:

Part No. & Color Marks—Part number marked on outer diameter of flat end of spring coil and spring also paint marked (one or more daubs of special color) as listed in Spring table below.

►**Ford Spring Production Change Mark**—No. 8A-5310-B spring used on first cars has loaded height of 9.2" and is marked by 2-daubs of white paint. Spring used on later cars has loaded height of 9.5" and is marked by 4-daubs of white paint.

►***CAUTION—These springs must not be mixed (use springs with same marking on both sides of car).***

Low & High Limit Spring Marks—Springs are graded in low and high limit groups and marked by GRIND MARK on flat end of spring as follows:

Low Limit Spring—1 Grind Mark.
High Limit Spring—2 Grind Marks.

►***SPRING INSTALLATION CAUTION—Springs on both sides of car must be matched (both springs same—Low Limit or High Limit). Car will have visible list toward low limit spring side and camber adjustment will be difficult if unlike springs used.***

Ford Spring Shim Installation (to correct Riding Height): If riding height not correct (see Riding Height data) but within limits which can be corrected by installation of shim, install **one** shim (Part No. 8A-5355) between top of spring and spring insulator on low side of car.

►***CAUTION—Do not install more than ONE shim on the spring (spring will not be held in place if more than one shim used).***

1949 Spring Specifications

Ford Models

Car Model	Part No.	Color Mark
Std. (exc. Convt.)	8A-5310-B	③White
Std. (Convt.)	8A-5310-C	④Blue
H.D. (exc. Convt.)	8A-5310-D	Yellow
H.D. (Convt.)	8AF-5310-A	Red
Lincoln & Cosmopolitan		
Lincoln (exc. Convt.)	8L-5310-A⑤	Red
Lincoln (Convt.)	8H-5310-B	White
Cosmpltn (Early)	8L-5310-A⑤	Red
Cosmpltn (Later)	8H-5310-B	White
All H.D.	8L-5310-B⑤	Blue
Mercury Models		
Std. (Early)①	8M-5310-A	Yellow
Std. (exc. Sta. Wgn.)②	8M-5310-C	Yellow
Sta. Wgn.	8M-5310-D	Green
H.D. (Early)①	8M-5310-B	Green
H.D. (Later)②	8M-5310-D	Green

①—First 2600 cars (used with two 8M-5355 shims).
②—After 2600 cars (no shims used).
③—First type marked by 2-daubs of white paint (loaded height 9.2"), Later type marked by 4-daubs of white paint (loaded height 9.5").
④—First springs marked by Yellow paint, changed to 2-daubs of BLUE paint to avoid confusion with Mercury springs.
⑤—Part No. 8M-5355 used between spring upper insulator and seat on first 1000 cars.

1950-51 Spring Specifications

Ford Models

	Part No.①	Color Mark
1950 Std. (exc. Convt.)	8A-5310-B	White
	8A-5310-D	3 Yellow
1950 Convt. (First)	8A-5310-C	②
1950 Convt. (Later)	0A-5310	3 Aluminum
1950 H.D. (exc. Convt.)	8A-5310-F	3 Red
1951 Std. (exc. below)	1A-5310-A	Yellow
1951 Convt.	1A-5310-B	Red
1951 Station Wagon	1A-5310-C	Blue
1951 H.D. (exc. Convt.)	1A-5310-C	Blue
Lincoln 0L & 1L		
1950-51 Std.	8L-5310-A	Red
1950-51 H.D.	8L-5310-B	Blue
Lincoln & Cosmopolitan 0H & 1H		
1950 Std. (exc. Convt.)	8H-5310-B	White
1950 Convt.	0H-5310-A	Orange
1950-51 H.D.	8L-5310-B	Blue
1951 Std. (exc. Convt.)	1H-5310-A	Gray
1951 H.D. (exc. Convt.)	1H-5310-B	Brown
1951 Convt. Std.	1H-5310-C	Orange
1951 Convt. H.D.	1H-5310-D	Purple
Mercury Models		
1950-51 Std. (exc. Sta. Wgn.)	8M-5310-C	Yellow
1950-51 Station Wagon	8M-5310-D	Green
1950-51 H.D.	8M-5310-D	Green

①—Number and color of paint marks.
②—2 Yellow or Blue marks. This spring superseded by No. 0A-5310 in pairs only.

FRAZER & KAISER

Frazer & Kaiser, All Models (1947-51)

►**INSTALLATION OF 1949 SPRINGS ON 1947-48 CARS:** 1949 type higher load rate springs can be installed on these cars. See SPRINGS below.

DESCRIPTION: Independent, linked parallelogram type with coil springs and direct acting shock absorbers.

CHECKING & ADJUSTMENT: Check front wheel bearing adjustment, tire inflation pressure, steering ing linkage for correct adjustment.

Tire Inflation: Check and inflate tires to following pressures (Cold) before checking front end:
6.50x15 Tires—28 lbs. front & rear.
6.70x15 & 7.10x15—24 lbs. front & rear.

Spring Deflection (Frame Height): Measure from top edge of lower control arm vertically to lower face of frame side rail at same point on each side of car. Measurement must be equal within ⅜".

Kingpin Inclination: 5½°. Limits 4¾-5¾° crosswise.

Caster: 0° desired, limits Neg. 1° to Pos. 1°.
Adjustment—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting from front bushing at outer end of upper control arm, use wrench KF-25 (Allen wrench) inserted through fitting hole to turn upper pivot pin in **complete revolutions only** (to avoid disturbing camber adjustment). Check Camber.

Camber: (1947-50) Positive ¼° desired, (1951) Positive ½° desired. Limits 0° to Pos. ¾°.
Adjustment—Same as for Caster (above) except that eccentric pivot pin should be turned not more than ½ revolution from point where correct caster secured (entire range of adjustment secured in ½ revolution of the pin).

Toe-In: (1947-50) 0" desired. Limits 0" to 1/16".
(1951) 1/8" desired. Limits 1/16" to 1/8"
Adjustment—Loosen clamp bolts at each end of both tie rods, turn **both tie rods equally.**

Steering Geometry (Toe-out on turns): With outer wheel turned 20°, inner wheel should be turned exactly 23°. No adjustment.

SHOCK ABSORBER REPLACEMENT: Raise front of car and disconnect shock absorbers. Compress shock and remove support through spring coils. Remove shock through hole in spring seat. Replace in same manner.

UPPER CONTROL ARM REPLACEMENT: Support car on jacks under frame, remove front wheel. Install jack under spring seat to hold spring and lower arm. Remove lockscrew in upper end of knuckle support. Remove bushings in outer end of upper

CONTINUED ON NEXT PAGE

FRAZER & KAISER (Cont.)

control arm, use Allen wrench to unscrew eccentric pin from knuckle support. Take out mounting screws in pivot shaft at inner end of control arm,

►*CAUTION—Do not lose camber adjustment shims under pivot shaft. These shims must be re-installed to maintain correct camber (not used on first cars).*

Pivot Shaft Bushing Installation: Install new bushings if old parts worn. To install bushings on pivot shaft at inner end of arm, assemble pivot shaft, new seals, and new bushings loosely in arm. Install Upper Suspension Arm Assembly Gauge, KF-7, tighten gauge setscrews to support control arm. Use thread cutting lubricant on bushings (bushings cut own thread), turn bushings in tight.

LOWER CONTROL ARM REPLACEMENT: Support car with jack under frame to rear to suspension unit. Disconnect front sway-eliminator link at spring seat, remove shock absorber (see above). Place jack under lower spring seat to support arm and spring. Take out pivot shaft mounting screws at inner end of arm. Relieve spring tension by lowering jack under spring seat. Disconnect control arm at knuckle support by unscrewing bolt from knuckle support bushing and arm. Lift out arm, spring, spring insulators.

►*CAUTION—Do not disturb bushing in lower end of knuckle support unless this bushing being replaced.*

Pivot Shaft Bushing Installation: Same as for upper control arm pivot shaft bushings (see data above), except that Lower Suspension Arm Assembly Gauge, KF-9, should be installed on inner end of arm to spread arm correctly while bushings being turned

KINGPIN BEARING REPLACEMENT: Disconnect steering arm. Drill ¼" hole in expansion plug above kingpin, pry plug out. Drive out kingpin locking pin, then drive kingpin and lower expansion plug out at bottom. Replace kingpin needle bearings with Driver KF-12. Install thrust bearing with open face down toward steering knuckle, install shims between knuckle support and thrust bearing, as required, so that pull required to turn steering knuckle is 2-5 lbs. measured at outer cotter pin hole.

SPRINGS: 1949 and later springs have lighter load rate than previous types (can be installed on 1947-48 cars if special instructions given below are followed).

1947-48 Spring Specifications

Car Model	Spring Part No.
All Models	201111

NOTE—1947-48 springs installed with Insulator No. 201112 (Upper), 202245 (Lower) in spring seats.

1949-50 Spring Specifications

Model	Color Mark	Part No.
All 4-Dr. Sdn.	Green	204354
Heavy Duty & Exp.	Yellow	203466
Convertible	Orange	205776
Utility & Virginian	Brown	206363
Taxicab	Yellow	203466

1951 Spring Specifications

Model	Color Mark	Part No.
Kaiser①	Brown	206363
Kaiser②	White	208368
Heavy Duty	Red	209781

①—Up to Serial No. 511-1212, 512-1009.
②—After Serial No. 511-1212, 512-1009.

Heavy Duty 1949-50 Springs—Marked by yellow paint mark on center coil and **must be used in pairs.**

►*CAUTION*—Heavy Duty front shock absorbers must be used with these heavy duty springs.

Spring Installation: 1949 service replacement springs paint marked on end coil to indicate load rating and special precautions should be taken when installing these springs as follows:

Red Paint Mark—Heavier than standard.
White Paint Mark—Lighter than standard.

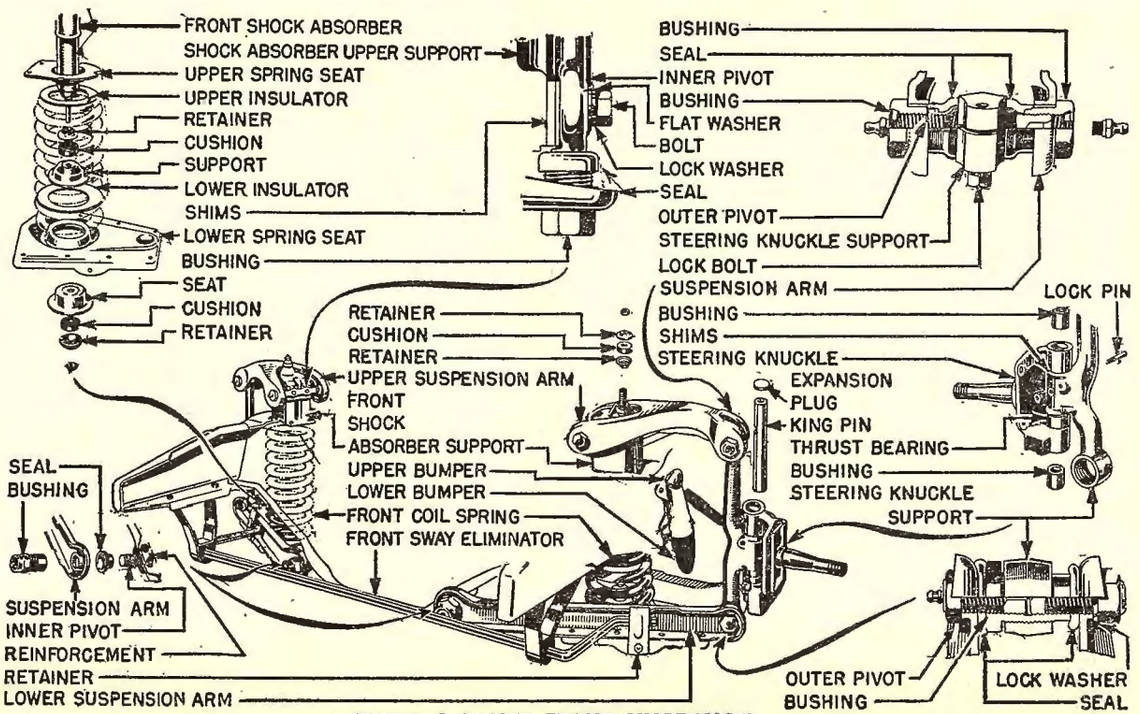
Red & White Springs used together—Install red marked spring on left side, white spring on right.

Two Red or Two White Springs used together—If any difference in load rating noted, install heavier spring on left side. Check spring deflection after installation completed and switch springs or install spacer on low spring if deflection not equal on both sides of car.

►**Installation of 1949 Springs on 1947-48 Cars**—1949 higher load rate springs can be installed on these cars **in pairs** without other change. If one spring installed, car will appear to sag on opposite side (due to greater stiffness of 1949 spring). This condition can be corrected by installing 1949 type modified upper spring seat and spacer on upper end of original spring.

►*CAUTION*—Spacer can not be used on spring on 1947-48 cars unless new 1949 type upper spring seat installed (will allow upper end of spring to slip out of position on spring seat).

Spacer Installation (to correct Spring Height): Spacer can be installed between upper end of spring and spring seat of low springs to correct spring deflection on **1949 & later cars only** (these cars have modified upper spring seat).



FRAZER & KAISER FRONT SUSPENSION

HENRY J

4 Cyl. Model 513 & 6 Cyl. 514 (1951)

DESCRIPTION: Independent, linked parallelogram type with coil springs, and direct acting shock absorbers mounted within the springs. Suspension system is made up of the following units:

Upper (Short) Control Arm—Pivoted at inner end on short mounting shaft bolted on inner side of shock absorber mounting bracket on frame side rail (camber and caster adjusting shims between shaft and bracket) with threaded bushing and rubber seal on each end of shaft. Arm is pivoted at outer end on a bolt threaded through the arm and through a threaded bushing in the upper end of the steering knuckle support. Bushing is locked in knuckle support by a clampscrew and a rubber seal is used on the bolt at each side of the buhsing.

Lower (long) Control Arm—Pivoted at inner and outer ends in same manner as upper arm (above.) Lower control arm shaft is bolted directly to the frame cross-member.

Coil Spring—Mounted on spring seat on lower control arm with upper end seated in pocket in frame side rail.

Shock Absorber—Direct acting hydraulic type mounted within coil spring with upper end bolted to shock absorber support on frame and lower end bolted to mounting plate on lower control arm spring seat. NOTE—Shock absorber can be removed without disturbing front suspension system.

Sway Eliminator—Consists of a bar clamped directly to each lower control arm. Bar does not have any frame connection.

CONTINUED ON NEXT PAGE

HENRY J (Cont.)

CHECKING & ADJUSTMENT: First check front wheel bearing adjustment, tire inflation pressure, steering gear adjustment, shock absorber action, and steering linkage for correct adjustment and freedom of movement, wheel and tire run-out, and front springs for sagging (car must be level crosswise). Make following checks with car on level floor:

Tire Inflation: 24 lbs. Cold, front and rear.

King Pin Inclination—4½° (limits 4° to 4¾°).

Caster: 0° desired (limits Neg. 1° to Pos. 1°). Controlled by shims on upper control arm inner shaft mounting bolts.

Adjustment—Loosen upper control arm inner shaft mounting bolts, install "half-shim" (on one bolt only) between shaft and mounting bracket placing shim at forward bolt to increase positive caster, or at rear bolt to increase negative caster.

►*CAUTION—do not disturb the "whole-shims" which are camber adjustment.*

Camber: Pos. ½° desired (limits Pos. ¼° to Pos. 1°). Controlled by shims on upper control arm inner shaft mounting bolts.

Adjustment—Loosen upper control arm inner shaft mounting bolts, install "whole-shims" (on both bolts) between shaft and mounting bracket to decrease camber, remove shim to increase camber. Same shim thickness must be added or removed at both shaft mounting bolts (use only "whole-shims" for this adjustment).

►*CAUTION—do not disturb the "half-shims" (at one bolt only) which are caster adjustment.*

Toe-In: ¼" desired (limits 3/16" to ¼").

Adjustment—Place steering wheel in centered posion with wheel spoke horizontal. Adjust right and left tie rods, as necessary, until both front wheels in straight-ahead position, then adjust toe-in by turning adjusting sleeve on each tie rod equally.

Toe-out on Turns: With inner wheel turned 20°, outer wheel should be turned 17°31'. No adjustment. Check for bent steering arms if toe-out incorrect.

HUDSON

Six & Eight, All Models (1940-51)

DESCRIPTION: Conventional type with knuckle support pivoted on outer ends of upper and lower support arms. Knuckle support upper pivot is an eccentric bushing (for Camber and Caster adjustment), lower support is a bushing and bolt assembly.

Upper Control Arm (1942 & Later Cars)—Steel stamping type (same as lower control arm) used beginning with late model 1942 cars. To adjust cars with this type control arm, new thin Eccentric Bushing Wrench No. KMO-366 must be used to turn the eccentric bushing (regular wrench is too thick to be inserted between control arm and knuckle support). New Upper Control Arm Spreader No. J-1860 is required to install bushings in this type arm. See instructions below. NOTE—Drop forged (1941 type) arm also used on 1942 cars.

CHECKING & ADJUSTMENT: Before checking specifications and making adjustments, always perform the following operations first:

Wheels & Tires—Check wheels and tires for balance and runout, correct if required. Inflate all tires to correct pressure. Check front wheel bearings and adjust if loose. Runout must not exceed 1/16-3/32".

Steering Linkage & Kingpin Looseness—Check kingpin bushings, drag link and connecting rod ends, and steering gear for looseness. Adjust steering gear and replace worn bushings and end joints.

Frame Level and Spring Height—Level car by rocking car sideways (not endwise) several times and allowing it to come to rest. Check spring height at each side of car. If heights not equal within ½", replace or shim low spring (see Springs below). NOTE—Car weight must be on wheels when checking following specifications.

Kingpin Inclination: Should be equal on both sides of car within ½°.

Kingpin Inclination

1940-47	4° 36' Crosswise
1948-51	3°36' Crosswise

NOTE—Kingpin inclination affected by Camber Adjustment (decreases as Camber increased).

Camber: As listed below. Should be equal within ½° on both sides of car. NOTE—Toe-in setting depends on Camber and should be checked when camber adjusted.

Camber Specification

1940-47	Pos. ¼° to Pos. ¾°
1948-51	Pos. ½° to Pos. 1½°

To Adjust—Adjusted by turning knuckle support upper eccentric pivot pin (Same as Caster Adjustment). See Caster Adjustment below and turn eccentric bushing not more than ½ turn from point where correct caster is secured.

Caster: As listed below. Should be equal within ½° on both sides of car.

Caster Specification

1940-47	0° plus or minus ½°
1948-51	Pos. ½° to Pos. 1½°

To Adjust—Loosen clamp bolt in upper end of knuckle support, turn eccentric bushing into support to increase caster, out of support to decrease caster. One complete turn of bushing will change caster ½°. Correct caster of 0° should be secured with center of knuckle support (clamp bolt center) exactly 1 11/32" ahead of face of upper support arm. After correct caster secured, turn bushing not more than ½ turn in either direction to adjust Camber (½ turn will give maximum camber adjustment of plus or minus ½°). Tighten clamp bolt. With Steel Stamping Type Upper Control Arm— Adjusted in same manner as drop forged arm type (above) except that special thin wrench, No. KMO-366, must be used to turn eccentric bushing.

Toe-In: As listed below. Measure at wheel rim with wheels set straight ahead and intermediate steering arm centered with tool J-1442.

Toe-In Specification

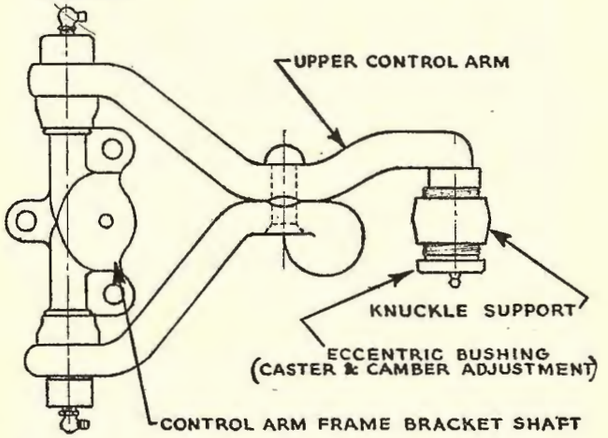
1940-47	0" to 1/16"
1948-51	1/32" (Limits 0" to 1/16")

To Adjust—Loosen clamp bolts and turn both tie rods equally. NOTE—Tie rod lengths must be equal.

Steering Geometry:—With inner wheel turned 30°, outer wheel should be turned exactly 25°. Allowable variation ½°. No adjustment provided (if incorrect, check for bent steering arms).

SERVICING: Spring Removal & Installation. To remove spring, support front of car on jack stand under inner side of lower support arm on side from which spring to be removed, remove shock absorber (see below), remove bolts from lower support arm inner pivot shaft bracket, raise car slowly and carefully until spring fully expanded. Install spring in same manner. Make certain that spring installed with flat end up and rubber-and-fibre silencer on upper end of spring, and see that lower end of spring properly seated in spring seat on lower support arm. Check spring height (see Springs below).

Shock Absorber Removal & Installation: Disconnect shock, remove lower anchor plate. Rotate shock ¼ turn and remove from below. Replace shock in same manner.



Upper Support Arm:—When installing frame mounting shaft bushings, use tool J-1360 installed on center stud of pivot shaft mounting, center arm in tool when bushing installed. See that seals installed on pivot shaft so that ends extend over ends of bushings. When installing knuckle support eccentric bushing, hold support 9/32" from shoulder on arm, screw into support and on arm until support is ⅞" from arm shoulder. Check Caster & Camber.

Upper Control Arm Pivot Pin & Eccentric Bushing (Steel Stamping Type)—Pivot consists of bolt and nut in eyes at outer end of arm and eccentric bushing clamped in upper end of knuckle support. To disassemble, loosen eccentric bushing clamp bolt, remove nut from pivot bolt, thread pivot bolt out of bushing and arm (eccentric bushing will remain in support). To assemble, install eccentric bushing in knuckle support (head of bushing toward front of car) but do not tighten clamp bolt. Hold knuckle support centralized in arm, thread bolt through arm and bushing until head is tight against arm, install nut and cotter pin. Tighten eccentric bushing clamp bolt after Caster & Camber have been adjusted.

Upper Control Arm Frame Pivot Bar & Bushings (Steel Stamping Type)—Bushings are threaded in arm and on pivot bar and must be installed exactly as follows: Install special gauge, No. J-1862, on outer stud of pivot bar, hold pivot centered in control arm and use special spreader tool, No. J-1860, to spread arms 1/16" so that gauge rests against outer faces of arms. Start bushings on both ends of pivot bar, lubricate bushings with tapping compound such as lard oil, thread bushings into arms until head seats against arms and tighten to 110 ft. lbs. Check to see that arm pivots freely on bar (arm should drop of own weight plus not less than 5 lb. pressure from a horizontal position). CAUTION

CONTINUED ON NEXT PAGE

HUDSON (Continued)

—Do not rotate pivot bar in arm as this will disturb centered position and make it impossible to secure correct Caster and Camber adjustment.

Lower Support Arm:—When installing inner pivot shaft, use tool J-1052 to maintain exact distance of 11½" between inner faces of lower support arms while bushings are being installed. Distance from inner face of support arm to center-line of frame mounting bolt holes must be exactly 1½" for correct alignment. Make certain that seals installed on shaft so that end of seals extends over inner ends of bushings.

Lower Control Arm Pivot Bushings—Lower control arms on both sides of car are similar except that bushing hole at front of car is .010" larger than hole at rear and arms must not be interchanged for this reason (Arms can be identified by ¼" hole punched in top plate of left arm assembly—right arm has no hole). Bushings are self-threading and should be lubricated with tapping compound such as lard oil when being installed.

SPRINGS: Install springs with flat end up and silencer on upper end of spring. If spring height (measured from upper face of lower support arm to lower edge of upper rubber bumper support bracket) is not equal within ½" on each side of car, spring should be replaced (rock car sideways and allow it to come to rest naturally before checking heights). A maximum of 2 shims .120" thick may be installed on top of low spring to correct minor height differences (replace springs if more than 2 shims required).

1940 Spring Specifications

Car Model	Part No.	Color Mark
40, 41, 48	160510	Light Blue
43	160511	Yellow
44, 45	160512	White
47 Right Side	160512	White
47 Left Side	160513	Green

1941 Spring Specifications

10, 11, 12	162530	Brick Red
18	162531	Pink
14, 15, 17 (Right)	162532	Violet
14, 15, 17 (Left)	162533	Steel Gray

1942 Spring Specifications

20 21, 22	162530	Brick Red
28	162531	Chrome Orange
24, 25, 27 (Left Side)	162533	Saratoga Cream
24, 25, 27 (Right Side)	162532	Violet
All (Optl. Heavy Duty)	160512	

1946-47 Spring Specifications

Car Model	Spring Color Mark
51, 52 ('46), 171, 172 ('47)	Bronze
53, 54 ('46), 173, 174 ('47)	Orange, Violet, Cream
58 ('46), 178 ('47)	Yellow, White, Green

1948-51 Spring Specifications

Car Model	Color & Part No.
All 6 & 8 (Std.-Light Scale)	Pink—300442
All 6 & 8 (Optl.-Heavy Scale)	Red—301621

Spring Identification Note—Springs are paint marked (on two center coils) for identification and have part number stamped on flat end of spring together with Brinell mark and limit marks as follows:

Low Limit Spring Mark—1 Grind Mark or daub of White Paint on lower coil.

High Limit Spring Mark—2 Grind Marks or daub of Red Paint on lower coil.

►**Spring Installation Caution**—Use High Limit Springs on driver's side of car.

NASH AMBASSADOR 1940-48

Nash Ambassador Six, All Models (1940 to 1948)
Nash Eight, All Models (1940-41-42)
Nash-Lafayette, Model 4010 (1940)

►**LOWER CONTROL ARM REPLACEMENT CAUTION (1940-42):** Threaded-bushing type control arm (as used on 1946 and later cars) are furnished for service and replace original type rubber-bushed control arm. See Servicing data for installation of new type arms.

DESCRIPTION: Linked parallelogram type with vertical knuckle support linked to short upper control arms.

Upper Control Arm (1941 & Later Cars): New type mounted on pivot bar on frame cross-member with Caster and Camber adjusting shims on bar at frame mounting bracket (see Adjustments below).

CHECKING & ADJUSTMENT: Always check following points first before making any adjustments:

CAUTION—Always place 2" blocks, Tool J-886, between frame top flange and front suspension upper control arms before jacking up car so as to remove weight from front wheels. Wheels must not be allowed to hang on control arms without these blocks being installed first.

Tire Inflation—Check tires and inflate to recommended pressure of 28 lbs. (4010, 4160, 4260), 27 lbs. (4020), 26 lbs. (Eight '40-42), 28 lbs. ('46-47), 24 lbs. (1948).

Wheel & Tire Balance & Runout—Check wheel and tire assemblies for balance. Check front wheels for runout which must not exceed ⅛".

Kingpin Inclination: 4½° crosswise. No adjustment.

Caster: 0° to Negative ½° with car weight on wheels.

Adjustment (1940)—Loosen clamp bolt in end of steering knuckle support, remove lubrication fitting in front bushing of outer end of upper control arm, insert special wrench, Tool J-720, in lubrication fitting hole and turn eccentric upper support pin clockwise to increase caster, counter-clockwise to decrease caster. Tighten knuckle support clamp bolt and replace lubrication fitting.

Adjustment (1941 On): Adjusting "C" washers installed on upper control arm pivot bar mounting bolts (between bar and frame bracket). These washers furnished 1/16" thick (equal to 1/3°). To adjust Caster, loosen pivot bar mounting bolts, add shim at **front** mounting bolt to increase Caster, add shim at **rear** mounting bolt to decrease Caster, tighten pivot bar bolts. Check Camber.

Camber:—Should be Positive ¼° to Positive ¾° for all models with car weight on wheels and car level

Adjustment (1940)—Adjust in same way as Caster above (wrench inserted through lubrication fitting hole in upper control arm front bushing) except that entire range of adjustment secured in ½ turn of eccentric pin. This adjustment changes caster but caster will be within limits given above providing that it has been correctly set first and pin is not turned more than ½ turn maximum.

Adjustment (1941 On): Uses the same "C" washers used for Caster setting (see Caster Adjustment above). To adjust Camber, 'C' washers should be added (to decrease Camber), removed (to increase Camber) **equally at both pivot bar mounting bolts.** One 1/16" thick 'C' washer will change Camber by 1/3° (normal factory installation consists of two 1/16" washers).

Toe-In: Measure 10" up from floor with wheels set in straight-ahead position.

Toe-In Specifications

1940-42 All Models	1/32—3/32"
1946-48 Amb. Models	1/16—3/16"

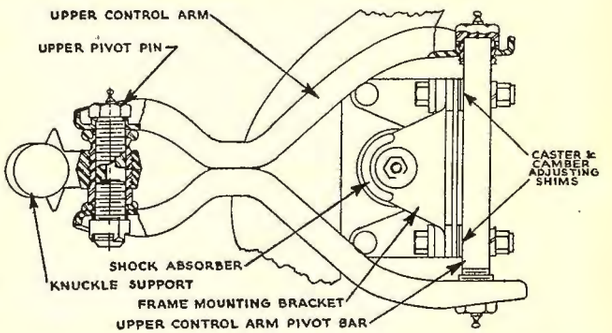
Adjustment—Loosen clamp bolts and turn each outer tie rod equally toward front of car to decrease toe-in, toward rear to increase toe-in. Center connecting rod is not adjustable.

Toe-out (Steering Geometry):—With outer wheel turned 20°, inner wheel should be turned exactly as listed below. No adjustment provided. If toe-out incorrect, check for bent steering arms.

Toe-Out Specifications

1940-42 All Models	21° ± ¾°
1946-48 Amb. Models	21½°

SERVICING: First type (1940) and later type (1941 on) control arms, bushings, and pivot pins are disassembled as follows:



Upper Control Arm & Pivot Pin (1940): Eccentric pivot pin is threaded in upper end of knuckle support and in bushings in front and rear upper control arms. Rear bushing is threaded in control arm. Front bushing is plain type and is locked in control arm by clamp bolt. Clearance between front face of control arm and head on bushing must be 1/32".

Upper Control Arm (1941 & Later Cars): Control arm mounting pivot bar is mounted on bushings threaded in through arm at each end of bar with seals at inner end of each bushing. When installing pivot bar, position bar within arm so that clearance at each end is equal, thread bushings in arm and on bar, tighten bushings to 150 ft. lbs. (use Torque Wrench J-1254). When installing control arm assembly on car, make certain that insulators installed on mounting bolt at each side of frame mounting bracket and that 'C' washers installed between pivot bar and frame bracket. See Caster &

Upper Control Arm Pivot Bolt (1941 & Later) Bolt threaded through eyes at outer end of upper control arm from the rear with a lockwasher and nut on end. Knuckle support is mounted on plain (not eccentric) bushings threaded on pivot pin between control arm eyes with seal at each end of bushing. When assembling pivot pin, see that bushing centered in control arm (clearance 3/16" and equal at each end of bushing), thread bolt in through control arm and bushing from front, install lockwasher and nut on rear end of bolt.

CONTINUED ON NEXT PAGE

NASH AMBASSADOR 1940-48 (Continued)

Lower Control Arm (1940-42): Control arm is mounted at inner (frame) end on rubber bushings on the ends of the frame mounting bar. Threaded bushings at outer end are same as type used on 1946 & later cars (following). When installing arm with rubber bushings, place plain washer on bar over bushing, tighten nut securely (shoulder on bar limits compression of rubber). ***Rubber bushings should not be lubricated.***

►**Replacement Arm & Bushing Note**—1946 & Later type lower control arm and threaded bushings furnished for replacement of the rubber-bushing type.

Lower Control Arm (1946 & Later): Lower control arm mounted at inner (frame) end on threaded bushings (same as used at outer end of arm). When installing arm, position mounting bar between arm so that clearance at each end is equal, tighten bushings to 150 ft. lbs.

Lower Control Arm Outer Pivot Pin. Pivot bolt is threaded in knuckle support bushing and in front and rear lower arms. Bushing is threaded on bolt and in lower end of knuckle support with rubber seal on bolt between each end of bushing and control arm. When assembling, bushing should be centered in control arm with equal clearance of 3/16" between each end of bushing and control arms.

SPRINGS: Coil springs same on all body styles and are interchangeable on 4010 and 4020. 4080 springs are paint marked for identification. Check spring heights on car with special height gauge, Tool J-709, which should fit between spring seat on lower control arm and lower face of front frame cross member. If spring height not correct, replace spring or install special ¼" spacer under spring.

1940 Spring Specifications

Model	Free Length	Loaded Height	Color Mark
4010, 20	13⅛"	9"	—
4080	13⅞"	9"	Yellow

1941 Spring Specifications

Model	Free Length	Color Mark
4160	13⅛"	None
4180	13⅛"	Yellow

1942 Spring Specifications

4260	15 1/16"	None
4280	15 3/16"	Yellow

Note—Color mark consists of paint mark on two center coils.

1946-47 Spring Specifications

Car Model	Free Length	Part No.
4660, 4760	14 13/16"	①3111316

1948 Spring Specifications

Car Model	Free Length	Part No.
4860	14 13/16"	①3111316

①—Spacer No. 3104309 (¼" thick) used with this spring.

Spring Identification Note—Springs are graded for load rate and may be identified by grind marks on end coil as follows: 1 Grind Mark—Low Limit, 2 Grind Marks—High Limit. Same type springs should be installed on both sides of car.

NASH RAMBLER 1950-51

Nash Rambler (1950-51)

►**FRONT SUSPENSION BRACE PRODUCTION CHANGE:** Beginning with car Serial No. D-66777 (1951) a brace connecting the two lower control arms entered production.

►**FRONT SUSPENSION BRACE INSTALLATION ON CARS BEFORE SERIAL NO. D-66777**—Front Suspension Brace Package, Part No. 3115311 contains all parts necessary for installation of brace on earlier cars.

►**LOWER CONTROL ARM RATTLE CORRECTION**—To prevent lower control arm rattle, a taper shim, Part No. 3111287 must be installed on each side of the lower control arm yoke. The shims are installed with the thick side to the top, between the control arm yoke and the lower control arm. This installation does not affect camber and caster adjustments.

►**CASTER AND CAMBER SHIM LOCATION CHANGE**—Shims have been relocated between the body bracket and spacers. The old location between pivot bar and spacers allowed a loss of torque on pivot bar bolts.

DESCRIPTION: Independent linked parallelogram type with new type coil spring and shock absorber mounting as follows:

►**CONTROL ARM ASSY. INTERCHANGEABILITY CAUTION:** Upper and Lower Control Arm Assemblies are interchangeable from right to left **except that front and rear horizontal arms are not interchangeable** (have 2° twist at inner end) and must be installed in pairs (one stamped "R", one stamped "L").

►**CHECKING GAUGE NOTE:** Flat gauge points provided on knuckle support pin for mounting of Gauge J-1377 to check Caster and Camber.

CHECKING & ADJUSTMENT: First check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, wheel and tire balance and runout, then place car on level floor and check following specifications:

Kingpin Inclination: 8½° crosswise. No adjustment.

Caster: 1° desired. Limits Pos. ¾° to Pos. 1¼°.
Adjustment—Loosen nuts on **lower** control arm frame mounted pivot bar bolts, add shims to pack on **rear mounting bolt to decrease caster, or front mounting bolt to increase caster.** Tighten bolt nuts securely after adjusting.

Camber: ½° desired. Limits Pos. ¼° to Pos. ¾°.
Adjustment—Adjust in same manner as Caster (above), except that shims should be **added or removed at both bolts equally** (to avoid disturbing caster). Add shims at both bolts equally to increase camber, remove shims to decrease camber.

Toe-In: ¼" desired. Limits ⅛" to ¼".
Adjustment—Loosen clamp bolts at each end of adjusting tube on outer end of **each tie rod,** turn both adjusting tubes equally.

Toe-Out on Turns: With outer wheel turned 20°, inner wheel should be turned 22½°, plus ½°, minus 0°. Check for bent steering arm if incorrect.

SHOCK ABSORBER REPLACEMENT: ***Not necessary to disturb Front Suspension Assembly.*** Remove bolts in upper and lower control arms which pass through shock absorber eyes, remove shock absorber.

COIL SPRING REPLACEMENT: Use Front Spring Compressor Set J-1608 or KMO-735 (same tools used on "600" suspension springs). Install compressor on spring with car weight on wheels, then raise front end of car so that suspension unit assembly drops down and frees spring, lift spring out.

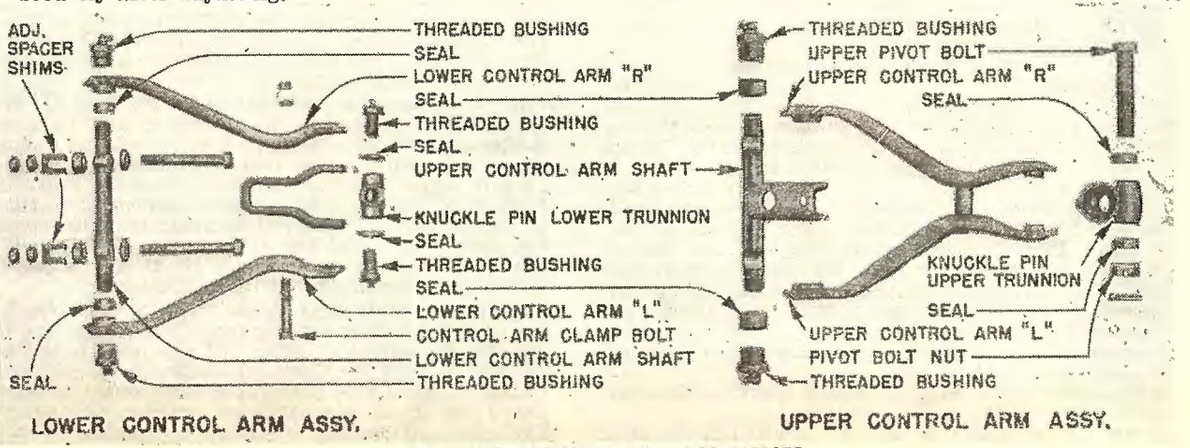
KNUCKLE SUPPORT PIN ASSEMBLY: Bolt spring seat to upper trunnion first, tightening retaining bolt securely. Screw knuckle support into trunnion until it is tight, **then back knuckle support out one complete turn** to prevent pin bottoming in trunnion when front wheels turned). Screw knuckle support into lower trunnion until clearance of approximately ¼" is provided between upper edge of seal seat on support and trunnion.

Upper Control Arm Trunnion Screw: The upper control arm marked 'R' has a larger pitch diameter thread than the arm marked 'L'. The trunnion screw is provided with a corresponding increase in thread pitch diameter. **At time of installation, the trunnion screw must always be started in the control arm marked 'R', first.**

SPRINGS: Heavier spring used on left side of car. Springs are installed with rubber cushion at top and bottom to prevent road noises being transmitted to body.

Spring Specifications

	Load	Height
Right	755 lbs. ±20 lbs.	10⅜"
Left	810 lbs. ±22 lbs.	10⅜"



RAMBLER CONTROL ARM ASSEMBLIES

NASH 1946-51

"600", All Series 1946-49)
Statesman Series, (1950-51)
Ambassador Series, (1949-51)

►**FRONT SUSPENSION ASSEMBLY UNIT REMOVAL:** If required for overhaul or repair, entire front suspension assembly can be removed as a unit by taking out four bolts which hold the unit on the right and left body sills.

►*CAUTION*—All parts of the rubber insulated mounting bolts must be correctly assembled when installing suspension assembly.

►**STEERING KNUCKLE PIN PRODUCTION CHANGE**—Beginning with Statesman Serial No. K-479398 (Hydra-matic), K-479418 (Synchro-mesh); Ambassador Serial No. R-631514, the steering knuckle pin has been revised to incorporate needle bearings in lower control arm trunnion.

►**1951 AMBASSADOR STEERING ARM PRODUCTION CHANGE**—Effective at Serial No. R-627607, steering arms have been increased in length from 8" to 8 17/32" (measured from center to center on holes). INCORRECT STEERING GEOMETRY WILL RESULT IF CORRECT STEERING ARM IS NOT USED.

DESCRIPTION: Linked parallelogram type with coil springs and independent shock absorbers.

CHECKING & ADJUSTMENT: First check wheel bearing adjustment, steering gear adjustment, tire inflation pressure, (see data below).

Tire Inflation Pressure: 25 lbs. (1946-47), 24 lbs. (1948-51) front and rear.

Kingpin Inclination: 7½° crosswise (1946-48), 8½° crosswise (1949-51). No adjustment.

Caster: Pos. ¼° to Pos. ¾° (1946-48), 0° to Pos. ½° (1949-51).

Adjustment—Loosen nuts at inner ends of upper control arm pivot bar frame mounting bolts, insert "C" washers between frame bracket and pivot bar at front bolt to decrease caster, or at rear bolt to increase caster. Check camber after completing adjustment.

►**Adjusting "C" Washer Note**—These washers furnished 1/16" and 1/8" thick. One 1/16" washer will change caster approximately 1/3°.

Camber: Pos. ¼° to Pos. ¾° (1946-48), 0° desired with limits of Neg. ¼° to Pos. ¼° (1949-51).

NOTE—Machined bosses provided on steering knuckle pin for mounting of J-1377 Caster & Camber Gauge.

Adjustment—Adjust in same manner as Caster (above) except that washers should be added (to increase Camber) or removed (to decrease Camber) **equally at front and rear pivot bar bolts** to avoid disturbing caster setting.

Toe-In: 1/8 to 3/16".

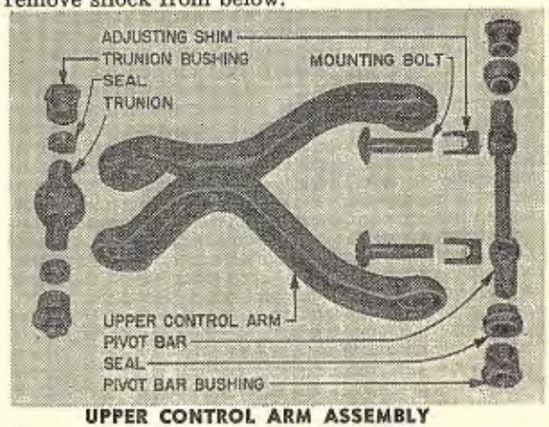
Adjustment—Loosen clamp bolt at each end of adjusting sleeves on both tie rods, turn adjusting sleeves on **both tie rods equally.**

Steering Geometry (Toe-out on turns): With outer wheel turned 20°, inner wheel should be turned 23¼° (600 '46-48), 23½° (600 '49 & Statesman '50-51), 23° (Amb. '49-51 See Steering Arm Change Note below), plus ½°, minus 0°. Check for bent steering arms if incorrect.

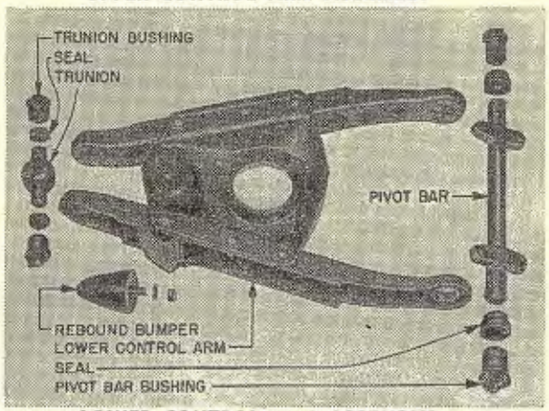
Steering Arm Check—Place straightedge across back of brake support plate, measure from this straightedge to center of steering arm ball stud. Should be 4 3/16" (600 & Statesman), 4 5/16" (Ambassador). Replace arm if incorrect.

►**1951 AMBASSADOR STEERING ARM PRODUCTION CHANGE**—Effective at Serial No. R-627607, steering arms have been increased in length from 8" to 8 17/32" (measured from center to center on holes). INCORRECT STEERING GEOMETRY WILL RESULT IF CORRECT STEERING ARM IS NOT USED.

SHOCK ABSORBER REPLACEMENT: ***Not necessary to disturb Front Suspension Assembly.*** Disconnect shocks, remove lower shock mounting bracket and remove shock from below.



UPPER CONTROL ARM ASSEMBLY



LOWER CONTROL ARM ASSEMBLY

COIL SPRING REPLACEMENT: Disconnect stabilizer arm link at lower control arm (Amb. only), remove shock absorber (see data above). Install jack under spring seat on lower control arm. Disconnect lower control arm from cross-member at inner control shaft. Raise car by means of a chain hoist until spring pressure relieved. Remove jack under spring seat, lower the lower control arm and lift spring out.

UPPER & LOWER CONTROL ARM REPLACEMENT: Pivot bar at inner end and trunnion at outer end of each arm have threaded bushings and rubber seals which should be installed as follows:

Outer Trunnion: Install new rubber seal on each end of trunnion, center trunnion in outer end of control arm (use Gauge J-2625 to center trunnion in lower control arm), thread bushings in through eyes in control arm and on trunnion ends, use extreme care that trunnion does not move out of centered position, tighten bushings to 125 ft. lbs.

Inner Pivot Bar: Install new rubber seal on each end of pivot bar, center pivot bar in inner end of control arm, thread bushings in through eyes of control arm and on bar ends, use care that bar does not move out of centered position, tighten bushings to 125 ft. lbs.

STEERING KNUCKLE PIN REPLACEMENT: Can be removed without disturbing caster and camber adjustment or other parts of suspension assembly as follows:

Removal: Install spring holding hooks J-2981 to keep front spring compressed (pull car down until hook can be engaged in hole in front suspension extension and in lower control arm). Support front end of car, remove wheel assembly, brake backing plate, and wheel spindle. Remove nut on lower end of knuckle pin, remove large washer, seal, and thrust bearing. Lift knuckle pin up and free of lower control arm, unscrew upper end from upper trunnion.

►***CAUTION—Do not lose spring in upper trunnion above knuckle pin.***

Installation: Use new rubber seals and position knuckle pin as follows:

Upper End—Place seal on pin with open cupped end upward, see that spring in place in trunnion, screw pin in trunnion until distance from top face of seal shoulder on pin to lower face of trunnion is ¼".

►***CAUTION—This ¼" clearance necessary to prevent binding and compression of the grease seal.***

Lower End—Place new seal ring on knuckle pin, insert lower end of pin down through lower trunnion bushing, install thrust bearing, large washer (with new seal ring in groove on rim of washer), and nut. Secure nut with cotter pin.

SPRINGS: ***CAUTION—Springs used on each series have special load rating and are not interchangeable between series.***

►**1951 FRONT SPRING PRODUCTION CHANGE**—Effective with Statesman (serial No. K-503238); Ambassador (serial No. R-649215), spring specifications were changed. *See Late 1951 Specifications below.*

1946-48 Spring Specifications

Car Model	Part No.
"600"	3121238

1949 Spring Specifications

	Free Height	Loaded Height①
"600" 4940	13 1/16"	9" (1640 lbs.)
Amb. 4960	13 3/8"	9" (1830 lbs.)

1950 Spring Specifications
1950 & Early 1951 Spring Specifications

Statesman	13 1/16"	9"②
Ambassador	13 5/8"	9"③

Late 1951 Spring Specifications

Statesman	13⅞"	9¼"④
Ambassador	14¼"	9¼"⑤

①—Indicated loads are plus or minus 40 lbs.
②—Load of 1640 lbs. (RH), 1830 lbs. (LH) ± 40 lbs.
③—Load of 1830 lbs. (RH), 1990 lbs. (LH) ± 45 lbs.
④—Load of 1830 lbs. (RH & LH) ± 45 lbs.
⑤—Load of 1990 lbs. (RH & LH) ± 49 lbs.

Spring Marking Note—Springs are graded and marked by grind mark on end coil as follows:

Low Limit—1 grind mark.
High Limit—2 grind marks.

►***INSTALLATION CAUTION***—If one Low Limit, and one High Limit spring, installed on same car, install High Limit spring on left (driver's) side of car.

NASH "600" 1941-42

Nash "600", Model 4140 (1941), 4240 (1942)

►**1946 & Later "600" NOTE:** Suspension unit is same design as used on Nash Ambassador models

DESCRIPTION: This suspension design consists of a sliding steering knuckle on a vertical fixed kingpin with the coil spring on the kingpin above the steering knuckle. Steering knuckle is mounted on 'hour-glass' type roller bearings and entire suspension system is covered by rubber boot or bellows to exclude dirt (bellows provided with breather with air cleaner mounted on frame). Kingpin is rigidly mounted on the front frame cross-member at the bottom and is positioned by two frame strut rods (Caster & Camber adjusters) at the top. In addition, both kingpins are tied together by a strut rod extending across the car between them and this rod serve also as the top mounting for the direct acting shock absorbers which are connected to the steering knuckles at the bottom (see illustration). With this type construction, wheel movement causes steering knuckle to slide up and down on the kingpin and is controlled by coil spring and shock absorber.

CHECKING & ADJUSTMENT: Check the following points first before making any adjustments:

Tire Inflation—Check tires and inflate to 28 lbs. (Std. 5.50x16 tires), 22 lbs. (Optl. 6.00-16).

Front Wheel Bearings—Check for looseness and adjust bearings if required.

Wheel & Tire Balance & Runout—Check front wheels and tire assemblies for balance. Check front wheels for runout which must not exceed 1/16". Mark high point on tire (point of greatest runout) and place this mark vertically (at top of wheel) when checking toe-in and toe-out (steering geometry), place mark horizontally (on one side) when checking Caster, Camber, and Kingpin Inclination.

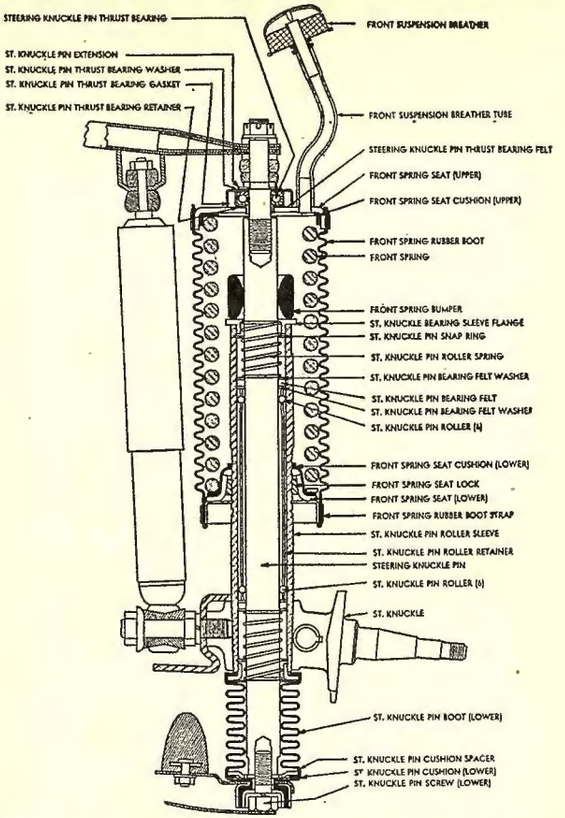
Wheel Straight-ahead Position—Wheels must be in straight ahead position with steering gear roller on 'high' point of worm. See Steering Gear article.

Spring or Frame Height—Springs should be same height so that car is level crosswise when at rest. See Spring data (below) for adjustment directions NOTE—Car weight must be on wheels when following specifications are being checked.

Kingpin Inclination:—5½° crosswise. Not adjustable (affected by camber adjustment—See Camber).

Caster:—0° ± ¼°. Controlled by brace rods attached to top of kingpin and frame on each side of car. **To Adjust**—Loosen nuts on frame bracket end of both brace rods attached to top of kingpin, turn nuts so as to shorten rear rod and lengthen front to increase caster, lengthen rear rod and shorten front rod to decrease caster. One and one-half turns of nut on each rod will change caster approximately ¼°. Tighten all nuts securely after adjustment completed. CAUTION—Rod can be adjusted only after nuts on second rod have been loosened to permit movement. Do not attempt to adjust one rod only.

Camber:—0° to Pos. ½°. Controlled by brace rods at upper ends of kingpin (same as Caster). NOTE—Kingpins are tied together by non-adjustable strut rod at upper ends so that any increase of camber causes equal decrease of camber at other wheel. **To Adjust**—Adjust in same manner as Caster (above) except that nuts should be turned so as to lengthen or shorten both the front and rear brace rods equally (Caster will be changed if rods adjusted unequally) and nuts must be loosened on opposite side of car to permit movement. CAUTION—Rods on one side of car can be adjusted only after rods on opposite side have been loosened.



Toe-in:—0-1/16" measured approximately 10" up from floor. Do not move wheels while checking. **To Adjust**—Loosen clamp bolts on adjusters at wheel end of each tie rod, turn both adjusters eqully. CAUTION—After toe-in adjusted, tie rod adjuster clamp bolts must be turned toward ground to prevent interference with body sill as wheel moves

Toe-out (Steering Geometry):—With outer wheel turned 20°, inner wheel should be turned 21° plus ½°. No adjustment. Check for bent steering arms.

SERVICING: Suspension Unit Removal—Loosen two clamps holding upper rubber boot (bellow) lower boot, install special clamps J-1608-SA-1 on lower coils of spring, raise wheels off floor and hook upper ends of clamps on top coil of spring, lower wheels and tighten clamps (clamps will hold spring compressed while unit being dismantled). Disconnect tie rods at steering knuckle arms, raise front end of car, remove wheel and brake drum, brake backing plate, and shock absorber. Remove steering knuckle pin screw holding lower end of kingpin on frame front cross-member (front axle channel), raise lower boot and install wrench on flats of kingpin to prevent it turning. Loosen nuts on brace rods at upper ends of both kingpins, remove strut or tierod extending across car between upper ends of kingpins, slip brace rods off top of kingpin, remove suspension unit from car.

Suspension Unit Disassembly—To dismantle assembly after removal from car (with upper boot loosened and clamps installed on springs), unscrew kingpin extension on upper end of kingpin, remove extension (with upper spring seat), lift off spring with clamps intact. Remove retainer spring and flange from upper end of kingpin by tapping lightly with hammer, remove lower spring seat and spring locks (locks are split washers installed in grooves in sleeve), remove screw, cushion and lower boot. Push kingpin toward upper end of sleeve and remove snap ring in groove in lower end of sleeve, then push kingpin toward lower end of sleeve and remove upper snap ring in same manner. Withdraw kingpin, roller retainer tube, and rollers from sleeve using care not to lose rollers (rollers will drop out of slots in retainer tube as it is withdrawn). Tap steering knuckle off lower end of sleeve. Wash all parts in clean gasoline and use extreme care to prevent dirt or other foreign matter entering assembly.

Suspension Unit Assembly—Clamp steering knuckle in vise and install sleeve. Lubricate kingpin, roller retainer and rollers with special Nash No. 94141 lubricant (pack the lubricant between roller retainer and kingpin), install assembly in sleeve (CAUTION—make certain that all rollers in place in retainer slots when retainer installed). Check to see that sleeve moves up and down and rotates freely on kingpin. Clamp unit in vise so that kingpin horizontal, install steel washer, felt washer, and second steel washer on upper end, push kingpin toward lower end of sleeve and install upper snap ring. Install same washer assembly on lower end of kingpin and install lower snap ring. Install lower retainer spring, flange, lower boot, cushion, disc and screw (do not tighten screw as it must be removed to install unit on car). Place unit vertically and install lower spring seat and locks (locks regularly installed in center groove—see spring data below), tap upper spring and flange in place using special driver. Install upper bumper and spring, install kingpin extension and tighten securely (hold kingpin from turning by wrench on flats at lower end). Leave clamps on spring until unit installed on car.

Lubrication:—Unit is packed with special lubricant, Nash No. 94141 and requires no attention in service (see Assembly directions above). Dirt must be prevented from entering assembly and upper and lower boots must be in place. Lower boot must be kept free from excessive lubricant (lower end of kingpin wiped clean before boot installed).

Air Cleaner:—On frame and connected to vent tube leading to upper boot. Air cleaner should be removed and washed in gasoline every 5000 miles.

SPRINGS: Front springs are same on all models and can be raised or lowered to compensate for unequal length and to level car crosswise. Spring height controlled by position of locks in slots on sleeve below lower spring seat. Shifting locks up or down one slot on sleeve will change spring length ⅜". Locks are regularly installed in middle slot in sleeve (1941 models), lower slot in sleeve (1942 models). NOTE—The additional lower grooves found on 1941 models are not used on 1942 models and consequently the spring can not be lowered on 1942 cars.

Spring Specifications

Car Model	Part No.
4140	3107019

NOTE—Right and Left springs are the same.

OLDSMOBILE & PONTIAC 1939

OLDSMOBILE MODELS

Six, 60 Model F-39, 70 Model G-39 (1939)
Eight, 80 Model L-39 (1939)

PONTIAC MODELS

Six, Quality Six 39-25, Deluxe 39-26 (1939)
Eight, Deluxe Model 39-28 (1939)

DESCRIPTION: Independent type with the following features:

Lower Control Arm Assembly—New type channel-section type arms which are riveted to spring seat (assembly cannot be dismantled). Seals are used on control arm shaft at control arm bushings (inner end) and on pivot pin at arm (outer end).

Spring—New type with top end only ground flat. Springs must be installed with this flat end up and end of lower coil fitted in recess in lower spring seat (coil end must register with hole in spring seat).

Steering Linkage—New type linkage with center (non-adjustable) tie rod linked between steering gear pitman arm and idler arm mounted on right hand frame side rail with individual adjustable tie rods between center tie rod and each wheel.

CHECKING & ADJUSTMENT: Car weight must be on wheels. Adjust front wheel bearings and check following points first:

Tire Inflation—Inflate tires evenly as follows: Oldsmobile—24 lbs. (front), 26 lbs. (rear). Pontiac—27 lbs. (Quality Six 6.00x16), 30 lbs. (Others 6.00x 16), 25 lbs. (Others 6.50x16).

Wheel Runout—Check wheel and tire eccentricity or runout. Correct if in excess of ⅛". Mark high point on tire and turn tire so that mark at top (vertically) when checking toe in and toe out, or at side (midway between top and bottom) when checking Caster, Camber, and Kingpin Inclination.

Kingpin Inclination—4°51'10" (Oldsmobile), 4½-5° (Pontiac) crosswise.

Toe In Adjustment:—To adjust, loosen clamp bolts on adjuster near wheel end of each side tie rod, turn adjuster on each tie rod equally. Toe in should be ⅛-3/16" for Oldsmobile models, 0-⅛" for Pontiac models (same as for 1938).

NOTE—Make certain that tie rod end ball stud aligned in seat before tightening clamp bolts.

Caster:—Should be 0° to Negative ¾° (all Oldsmobile and Pontiac models) and equal for both wheels within ½°. Adjusted in same manner as in 1938 (loosen clamp bolt at upper end of steering knuckle support, remove lubricant fitting on upper pivot pin front bushing, insert Allen wrench through lubricant fitting hole, turn eccentric pivot pin clockwise to increase caster, counter-clockwise to decrease caster, in complete turns only—camber adjustment will be disturbed otherwise).

Camber:—Should be ⅛-1° and equal within ½° for both sides of car. Pontiac preferred camber is ⅜-¾° with service limits of Neg ½° to Pos. 1°. Camber can also be checked by measuring distance from square placed on level floor to wheel felloe at top and bottom. Distance at top should be 1/32-9/32" less than at bottom (wheel should lean out at top) and both sides of car must be equal within 9/64". Adjust in same manner as for 1938 cars (turn upper pivot pin with Allen wrench in same manner as for Caster adjustment. do not turn pin more than 180° which provides entire range of adjustment—turning pivot pin more than this amount will change caster setting excessively).

Steering Geometry (toe out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned 23° plus or minus ½° (all models). Correct by replacing steering arms (no adjustment).

CONTROL ARM ASSEMBLY: Lower Control Arm—Serviced as an assembly and not interchangeable on right and left sides of car. Pivot shaft at inner ends of control arms can be removed by taking out bushing in each arm. To install shaft, install tool J-1052 or block between arms adjacent to shaft eyes so that distance between inner faces of arms at shaft eyes is exactly 11½" (necessary to prevent distortion of arms when bushings installed). Install shaft with seal on each end adjacent to mounting bracket, thread bushing in on shaft and in arm simultaneously (new bushings not threaded on outside and cut their own thread as they are turned in), tighten bushings with 150 lb. pull on 16" wrench (200 lbs. on 12" wrench) so that there is no clearance between bushing flange and control arm. See that distance between shaft bracket mounting holes and inner face of control arm is exactly 1½" at each end (turn shaft to centralize), and that seal ends lap over bushings.

Front Stabilizer Bar:—To remove, remove nut on upper end of link bolts, pull bolts out from below. Remove bracket bolts at stabilizer frame mounting, remove stabilizer bar. NOTE—On Oldsmobile L-39 Eight, radiator lower support (removable cross-member) must be removed with stabilizer (radiator need not be removed but must be supported while cross-member is out of car). Stabilizer bar rubber bearings (frame mounting) are serviced separately. When installing stabilizer links, make certain that spacer installed on bolt between arm and control arm mountings, place one rubber block and one steel retainer on both top and bottom of stabilizer arm and control arm bracket, tighten bolt nut to limit of threads and install locknut.

SPRINGS: Removal & Installation—To remove springs, disconnect stabilizer link and tie rod, support car with chain hoist, install jack under spring seat on lower control arm, remove knuckle support lower pivot pin, raise car or lower jack under lower control arm to relieve tension on spring, remove spring. Install in same manner.

NOTE—Install spring with ground (flat) end up Spring lower end (not ground flat) must be fitted in recess in spring seat on lower control arm.

Spring Identification—Oldsmobile springs have part number stamped on outside of one end coil and paint mark as follows:

Oldsmobile Springs

Model	Diameter of Wire	Color Mark
F-39 '60'	.594"	Red
G-39 '70'	.608"	Yellow
L-39 '80'	.635"	Brown

Pontiac Springs

Model	Diameter of Wire	Free Length
39-25 Qual. 6	.630"	13 31/32"
39-26 Deluxe 6	.630"	14 3/16"
39-28 Deluxe 8	.635"	14 7/16"

OLDSMOBILE 1940-51

Six & Eight, All Models (1940-51)

►**Oldsmobile Camber Adjustment (Upper Pivot Pin) Production Change:** Eccentricity of pin (for Camber adjustment) is 1/16" (1940 & 1942 cars), 3/32" (1941 cars). This special 3/32" pin can be secured from Oldsmobile Parts Dept., No. 506512, to provide greater range of adjustment on 1940 & later cars if required to secure correct setting.

DESCRIPTION: Linked parallelogram type with coil springs. Design is similar on all models with exception of Upper Pivot Pin (camber adjustment) which was changed in 1941 as follows:

Camber Adjustment (Upper Pivot Pin)—Amount of eccentricity increased from 1/16" to 3/32" for greater range of camber adjustment (see Camber). **Upper Control Arm (76 & 88 1949-50)**—Arms on these models are 7/16" shorter than on previous cars.

CHECKING & ADJUSTMENT: Check & adjust front wheel bearings, check kingpins for looseness, check shock absorbers and following points:

Tire Inflation—Check tires and inflate to following pressures:

	Front	Rear
Olds. 60, 90 ('40)	27 lbs.	27 lbs.
Olds. 70 ('40)	25 lbs.	25 lbs.
Olds. 66 ('41-42)	28 lbs.	28 lbs.
Olds. 68, 76, 78 ('41-42)	26 lbs.	26 lbs.
Olds. 96, 98 ('41-42)	24 lbs.	24 lbs.
Olds. 66, 68, 76, 78 ('46-47)	28 lbs.	28 lbs.
Olds. 98 ('46-47)	24 lbs.	24 lbs.
Olds, All Models ('48-51)	④	④

④—28 lbs. (6.00x16, 6.50x16, 6.50x15 Tires), 24 lbs. (7.60x15 & 8.00x15 Tires), 22 lbs. (8.20x15 Tires).

Wheel Runout—Check wheels and tires for run-out. Must not exceed ⅛". Mark 'high' point on tire and place this mark at top (vertically) when checking Toe-in and Toe-out, at one side (horizontally) to check Caster, Camber & Kingpin Inclination.

Frame Height—Raise and lower front end of car several times by grasping front bumper to allow frame to come to normal level.

NOTE—Car weight must be on wheels and wheels should be set in straight ahead position when checking adjustment.

Kingpin Inclinations: 4°51'10" (1940-48), 4°29'47" (1949-51) crosswise. No adjustment.

Caster: Must be equal within ½° on both sides. Machined bosses provided on front side of knuckle support for protractor mounting.

Caster Specifications

Oldsmobile (All Models)	0° to Neg. ¾°

To Adjust—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting on front bushing of upper support pivot pin, insert Allen wrench J-720 through lubricant fitting hole and turn upper pivot pin clockwise to increase caster, counter-clockwise to decrease caster. CAUTION—Pin must always be turned in complete turns only to avoid disturbing camber adjustment (below).

Camber: Camber adjustment (upper pivot pin) eccentricity is 1/16". 3/32" pin is available from the Parts Dept. and can be installed if regular 1/16" pin does not give sufficient range of adjustment.

Camber Specifications

Oldsmobile (1940-48)	Neg. ¼° to Pos. ¾°
Oldsmobile (1949-51)	①Neg. ¾° to Pos. ¾°

①—New Car limits Neg. ¼° to Pos. ¾°.

To Adjust—Same as for Caster (above) except that

CONTINUED ON NEXT PAGE

OLDSMOBILE 1940-51 (Cont.)

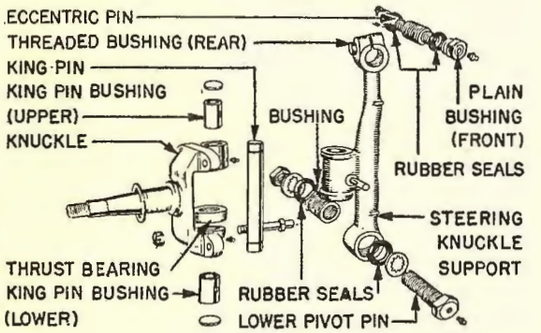
entire range of adjustment secured in ½ turn of eccentric pivot pin. CAUTION—Do not turn pin more than ½ turn when adjusting camber to avoid disturbing caster adjustment.

Toe-In: Measure 9-10" above floor with wheels turned straight ahead.

Toe-In Specification

Oldsmobile (All Models)	1/16-1/8"

To Adjust—Loosen clamp bolts at wheel end of each tie rod, turn tie rod adjuster on each rod equally. On Oldsmobile, turn both adjusters in direction opposite to that in which wheel revolves to increase toe-in.



Steering Geometry (toe-out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned 23° ± ½°. No adjustment provided (check for bent steering arms if incorrect).

SERVICING: Lower Control Arm & Pivot Shaft. Serviced as an assembly and not interchangeable on right and left sides of car. Pivot shaft at inner ends of control arms can be removed by taking out bushing in each arm. To install shaft, install tool J-1052 or block between arms adjacent to shaft eyes so that distance between inner faces of arms at shaft eyes is exactly 11½" (necessary to prevent distortion of arms when bushings installed). Install shaft with seal on each end adjacent to mounting bracket, thread bushing in on shaft and in arm simultaneously (new bushings cut their own thread in arm as they are turned in), tighten bushings with 150 lb. pull on 16" wrench (200 lbs. on 12" wrench) so that there is no clearance between bushing flange and control arm. See that distance between shaft bracket mounting holes and inner face of control arm is exactly 1½" at each end (turn shaft to centralize), and that seal ends lap over bushings.

Knuckle Support Lower Pivot Pin—To install pin, slip rubber seal over outer end of each lower control arm, center knuckle support between lower control arms (approximately ⅛" between end of bushing and front arm, same distance between head of bushing and rear arm). Screw pivot pin through front arm, knuckle support bushing, rear arm, install nut on rear end of pin. Pull seals down over end of arms so that they seat on pin between arm and bushing at each side.

Knuckle Support Upper Pivot Pin—To install, center knuckle support in upper control arm yoke, screw pivot pin in until larger center section is centered in knuckle support, tighten clamp bolt. Install seal on pin at each side, start front bushing in on pin, then screw rear bushing in control arm and on pin and tighten securely. Turn front bushing in until clearance between front face or arm and head of bushing 1/32", tighten clamp bolt.

Kingpin Installation (Oldsmobile)—Bushings should be installed with oil hole lined up with oil hole in knuckle support and short groove on inner surface leading from oil hole to outer end of bushing (up on top bushing, down on lower bushing). Bushings should be burnished with J-722-1 burnishing tool and line-reamed to size with tool HM-592.

SPRINGS: Lower end of spring not ground flat and must be installed with end coil fitted into recess in lower spring seat. Upper end of spring is ground flat. CAUTION—Spring must be installed with flat (ground) end up and lower end fitted in spring seat. Springs are paint-marked for identification.

1940 Oldsmobile Springs

Model	Wire Diameter	Color Mark
60, 70	.608"	Yellow
90	.635"	Brown

1941 Oldsmobile Springs

66	.587"	Green & Orange
68	.625"	Aluminum
76, 96	.619"	Green & Yellow
78, 98	.635"	Green & Brown

1942 Oldsmobile Springs

66	.608"	Green & Orange
68	.642"	Brown
76	.619"	Yellow
78, 98	.642"	Green & Gray

Car Model	1946-47 Oldsmobile Springs	Part No.
66	(exc. Bus. Coupe & Convertible)	419273
66	(Business Coupe)	419798
66	(Convertible)	419276
66	(Station Wagon)	417864
76		418782
78, 98	(2-door Club Sedan)	418783
98	(4-door Sedan)	419540
98	(Convertible)	419534

1948 Oldsmobile Springs

Car Model	Color Mark & Part No.
66 exc. Sta. Wgn. & Conv.	Green & Blue—419273
66 Station Wagon	Green & Yellow—417864
66 Convertible	Green & Red—419276
76	Yellow & Rust—418782
68 exc. Sta. Wgn. & Conv.	Green & Rust—554166
68 Station Wagon	Brown—417862
78 (All) & 68 Convertible	Green & Gray—418783
98 except Convertible	Green—419534
98 Convertible	Yellow & Brown—554955

1949 Oldsmobile Springs

76 exc. Sta. Wgn. & Convt.	Red—509040
76 Sta. Wgn. & Convt.	Grey & Yellow—511138
88 exc. Sta. Wgn. & Convt.	Grey & Yellow—511138
88 Sta. Wgn.	Red & Blue—419540
88 Convt.	Green—419534
98 exc. Convt.	Green—419534
98 Convt.	Yellow & Brown—554995

1950 Oldsmobile Springs

76 exc. Sta. Wgn. & Convt.	Red—509040
76 Sta. Wgn. & Convt.	Grey & Yellow—511138
88 exc. Sta. Wgn. & Convt.	Grey & Yellow—511138
88 Station Wagon	Red & Blue—558864
88 Convertible	Yellow & Brown—558865
98 exc. Holiday & Convt.	Green & Aluminum—558789
98 Holiday Coupe	Green & Blue—558790
98 Convertible	Yellow & Aluminum—559362

1951 Spring Specifications

88 (all)	Grey & Yellow—511138
Super 88 exc. Convt.	Red & Yellow—511755
Super 88 Convt.	Blue & Yellow—512928
98 Sedan	Green & Aluminum—558789
98 Holiday Coupe	Blue & Green—558790
98 Convt.	Red & Aluminum—559362

Color Mark—Consists of one or two paint daubs on one spring coil.

PONTIAC 1940-48

Six & Eight, All Models (1940-1948)

►**Pontiac Camber Adjustment (Upper Pivot Pin) Production Change:** Pin with 1/16" eccentricity (for Camber adjustment) used on 1940 cars, new type with 3/32" eccentricity providing greater range of adjustment used on 1941 and later cars.

DESCRIPTION: Linked parallelogram type with coil springs. Design similar on all models with exception of Upper Pivot Pin (camber adjustment) which was changed in 1941 as described above.

CHECKING & ADJUSTMENT: Check and adjust front wheel bearings, check kingpins for looseness, check shock absorber action. Then check and adjust following points:

Tire Inflation: Check and inflate tires:	Front	Rear
Pontiac 40-25, 26 ('40)	26 lbs.	28 lbs.
Pontiac 40-26, 28 ('40)①	23 lbs.	25 lbs.
Pontiac 40-29 ('40)	28 lbs.	28 lbs.
Pontiac All ('41-42)	28 lbs.	28 lbs.
Pontiac ('42)①	24 lbs.	24 lbs.
Pontiac All ('46-48)②	28 lbs.	28 lbs.
Pontiac All ('46-48)①	26 lbs.	26 lbs.
Pontiac Sta. Wgn. ('46-47)③	32 lbs.	32 lbs.
Pontiac Sta. Wgn. ('48) ③	27 lbs.	36 lbs.

①—6.50x16 Tires. ②—6.00x16 Tires.
③—6 Ply 6.50x16 Tires.

Wheel Run-out: Wheel and tire run-out must not exceed ⅛". Mark "high" point of tire and place this mark at top (vertically) when checking toe-in and toe-out, place mark at one side when checking Caster, Camber, and Kingpin Inclination.

Kingpin Inclination: NOTE—Specifications on Pontiac supersedes original specification of 4⅜-4⅞° previously listed for these cars.

Kingpin Inclination

Pontiac (1940)	4⅝-5¼° Crosswise
Pontiac (1941-48)	5½-6° Crosswise

Frame Height: Raise and lower front end of car several times by grasping front bumper to allow frame to come to normal level.

CONTINUED ON NEXT PAGE

PONTIAC 1940-48 (Cont.)

NOTE—Car weight must be on wheels and wheels must be set in straight-ahead position when checking following specifications.

Caster: Neg. ¾° (Neg. ½° to Neg. 1°) and equal within ½° on both sides.

To Adjust—Loosen clamp bolt in upper end of knuckle support, remove lubricant fitting on front bushing of upper support pivot pin, insert Allen wrench J-720 through lubricant fitting hole and turn upper pivot pin clockwise to increase caster, counter-clockwise to decrease caster. CAUTION—Pin must always be turned in complete turns only to avoid disturbing camber adjustment (below).

Camber: (1940) Pos. ⅜°. Limits 0° to Pos. ⅝°. (1941-48) 0°. Limits Neg. ¼° to Pos. ¼°.

To Adjust—Same as for Caster (above) except that entire range of adjustment secured in ½ turn of eccentric pivot pin. CAUTION—Do not turn pin more than ½ turn when adjusting camber to avoid disturbing caster adjustment.

Toe-In: 0" to 1/16" measured 9-10" above floor.

To Adjust: Loosen clamp bolts at wheel end of each tie rod, turn tie rod adjuster on each rod equally. Turn right hand adjuster in same direction as forward wheel rotation and left hand adjuster in opposite direction to increase toe-in.

Steering Geometry (toe-out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned 23° ± ½°. No adjustment provided (check for bent steering arms if incorrect).

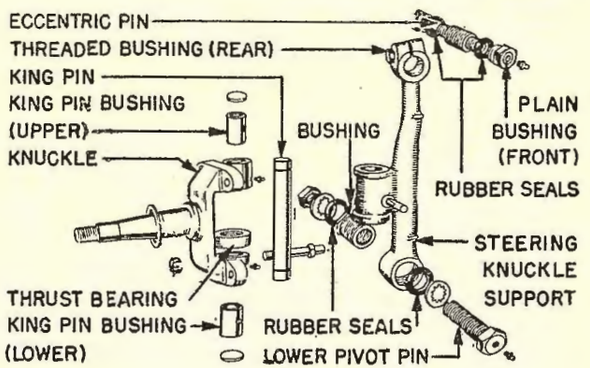
SERVICING: Lower Control Arm & Pivot Shaft. Serviced as an assembly and not interchangeable on right and left sides of car. Pivot shaft at inner ends of control arms can be removed by taking out bushing in each arm. To install shaft, install tool J-1052 or block between arms adjacent to shaft eyes so that distance between inner faces of arms at shaft eyes is exactly 11½" (necessary to prevent distortion of arms when bushings installed). Install shaft with seal on each end adjacent to mounting bracket, thread bushing in on shaft and in arm simultaneously (new bushings cut their own thread in arm as they are turned in), tighten bushings with 150 lb. pull on 16" wrench (200 lbs. on 12" wrench) so that there is no clearance between bushing flange and control arm. See that distance between shaft bracket mounting holes and inner face of control arm is exactly 1½" at each end (turn shaft to centralize), and that seal ends lap over bushings.

Knuckle Support Lower Pivot Pin—To install pin, slip rubber seal over outer end of each lower control arm center knuckle support between lower control arms (approximately ⅛" between end of bushing and front arm, same distance between head of bushing and rear arm). Screw pivot pin through front arm, knuckle support bushing, rear arm, install nut on rear end of pin. Pull seals down over end of arms so that they seat on pin between arm and bushing at each side.

Knuckle Support Upper Pivot Pin—To install, center knuckle support in upper control arm yoke, screw pivot pin in until larger center section is centered in knuckle support, tighten clamp bolt. Install seal on pin at each side, start front bushing in on pin, then screw rear bushing in control arm and on pin and tighten securely. Turn front bushing in until clearance between front face or arm and head of bushing 1/32", tighten clamp bolt.

Kingpin Installation—Bushings are floating type and should be installed with lubrication groove on inner face leading toward outer end of bushings (up on top bushing, down on lower).

SPRINGS:—Lower end of spring not ground flat and must be installed with end coil fitted into recess in lower spring seat. Upper end of spring is ground flat. CAUTION—Spring must be installed with flat (ground) end up and lower end fitted in spring seat.



1940 Pontiac Springs

Model	Wire Diameter	Free Length
40-25	.594"	14⅞"
40-26	.608"	14 27/32"
40-28	.635"	14 7/16"
40-29	.635"	14 27/32"

1941 Pontiac Springs

41-24, 26, 27	.608"	15 3/16"
41-25	.608"	14 27/32"
41-28, 29	.625"	15 15/32"

1942 Pontiac Springs

42-25	.608"	14 27/32"
42-26, 27	.608"	15 3/16"
42-28	.625"	15 15/32"

1946-47-48 Pontiac Springs

Car Model	Spring Part No.
25 Torpedo 6 (except Convt. & Taxi)	509037
26 Strmlnr. 6 (exc. Sta. Wgn. & Taxi)	509039
27 Torpedo 8 (except Convt.)	509039
28 Strmlnr. 8 (except Sta. Wgn.)	509040
25 & 27 Convertibles	509038
25 Taxicab	509039
26 Taxicab	509040
26 & 28 Station Wagon	508116

PONTIAC 1949-51

Six & Eight, All Models (1949-51)

►**REBOUND NOISE CORRECTION**—If upper control arm strikes frame on extreme rebounds (causing loud metallic noise), standard steering knuckle support upper control arm rubber bumper can be replaced by special higher bumper which will prevent this contact (NOTE—Change bumpers on both sides

Upper Control Arm Bumper

Standard (1¾" long)....Part No. 1298323
Special (2¼" long)....Part No. 3687670

DESCRIPTION: New design, independent, linked parallelogram type with direct acting shock absorbers mounted within the coil springs, and new type upper control arm (not part of shock absorber assembly). Cross-member on which suspension unit mounted has separate brackets for upper control arm shaft mounting, for shock absorber mounting. exceed ⅛"), then place car on level floor and check front end specifications as follows:
each side of car and should not be less than on other cars. Unequal or less than standard heights indicate sagged springs. See Springs.

CHECKING & ADJUSTMENT: First check entire front end for wear and excessive play, inflate tires to correct pressures (see data below), check steering gear adjustment, wheel bearing adjustment, wheel and tire balance and run-out (run-out should not exceed 1/8"). Place car on level floor, "jounce" car at rear and front (see Leveling instructions) and check frame height. Then check and adjust all front end specifications in following order:

Leveling Frame: Jounce the car at the rear and then at the front end by grasping the bumper and raising and lowering the car violently at beginning to loosen up the suspension action and then with diminishing pressure until it finally comes to rest. Then measure frame height.

Frame Height—Measure vertical distance from underside of frame rail to top of lower control arm on each side of car. Distance should be the same on on each side of car. Unequal heights indicate sagged springs. See spring data.

Tire Inflation Pressure: For each tire size (Cold)
7.10x15 (Std.)—24 lbs. Front & Rear.
7.60x15 (Optl.)—22 lbs. Front, 20 lbs. Rear.
7.10x15 (Sta. Wgn. & Sedan Del.)—28 lbs. Front, 30 lbs. Rear.

Kingpin Inclination: 5° (4¾-5¼°) crosswise.

Caster: Neg. ¾° preferred, limits Neg. ½° to Neg. 1°.

Adjustment—Loosen clamp bolt in upper end of knuckle support, use special wrench J-2998 to engage hexagonal head of bushing on pivot bolt in upper end of support, adjust caster by turning bushing in **complete turns only** to avoid disturbing camber.

►*CAUTION*—Clearance must be maintained between ends of bushing and control arm throughout suspension unit travel. Check for binding when adjusting caster.

CONTINUED ON NEXT PAGE

PONTIAC 1949-51 (Cont.)

Camber: 0° preferred, limits Neg. ¼° to Pos. ¼°. **Adjustment**—Same as for Caster (above) except that eccentric bushing should be turned not more than ½ revolution from point where correct caster secured (entire range of adjustment secured in ½ revolution of the bushing).

►*ADDITIONAL RANGE OF ADJUSTMENT*—If correct camber cannot be secured by above adjustment, greater range of adjustment can be secured by taking out mounting capscrews in upper control arm shaft (on frame bracket at inner end of arm) and turning shaft over so that offset mounting holes tend to move shaft and control arm outward. This will provide approximately 2/3° additional camber.

►*NOTE*—Control arm shaft is installed at factory with notch on side of shaft toward engine. When shaft turned over for increased camber, notch will be outward or toward wheel.

Toe-In: 0" to 1/16" measured 9" above floor. **Adjustment**—Loosen clamp bolts at each end of adjusting sleeve at outer end of each tie rod, turn adjusting sleeves on **both tie rods equally.**

Toe-out on Turns: With **inner** wheel turned exactly 20°, **outer** wheel should be turned 18-19°. No adjustment. Check for bent steering arms if not correct.

SHOCK ABSORBER REPLACEMENT: ***Not necessary to disturb Front Suspension Assembly.*** Shock absorbers can be removed from below or above as desired.

Removal (from below)—Remove locknut and retainer nut on shock absorber upper stem at mounting bracket on frame, lift off upper grommet retainer and upper grommet (NOTE—If shock absorber turns when removing retainer nut, remove unit from above—see directions below). Remove three screws holding shock absorber lower mounting bracket on underside of spring seat on lower control arm, lower shock absorber and mounting bracket assembly out through hole in spring seat.

Removal (from above)—Jack up car, remove locknut and retainer nut from shock absorber lower stem at mounting bracket on underside of lower control arm (use pliers inserted through spring coil to keep shock absorber from turning), remove lower grommet retainer and lower grommet. Remove two nuts on shock absorber upper mounting bracket studs, lift shock absorber and upper mounting bracket assembly up and out through opening in frame above front wheel.

►*INSTALLATION CAUTION*—Hold shock absorber from turning (with pliers inserted between spring coils) when tightening mounting nuts.

COIL SPRING REPLACEMENT: Disconnect lower end of stabilizer link and remove shock absorber on side on which spring being removed. Lift front end of car with chain hoist or with jacks placed under frame side rails. Place additional jack under lower spring seat on control arm. Disconnect lower control arm from knuckle support by removing locknut and unscrewing lower pivot bolt. Lift car slowly (or lower jack under control arm) to relieve spring tension, lift spring out.

►*INSTALLATION CAUTION*—Install spring with flatted end at top and centered within positioning lugs on cross-member. See that end coil at bottom is fitted into spring recess in lower spring seat.

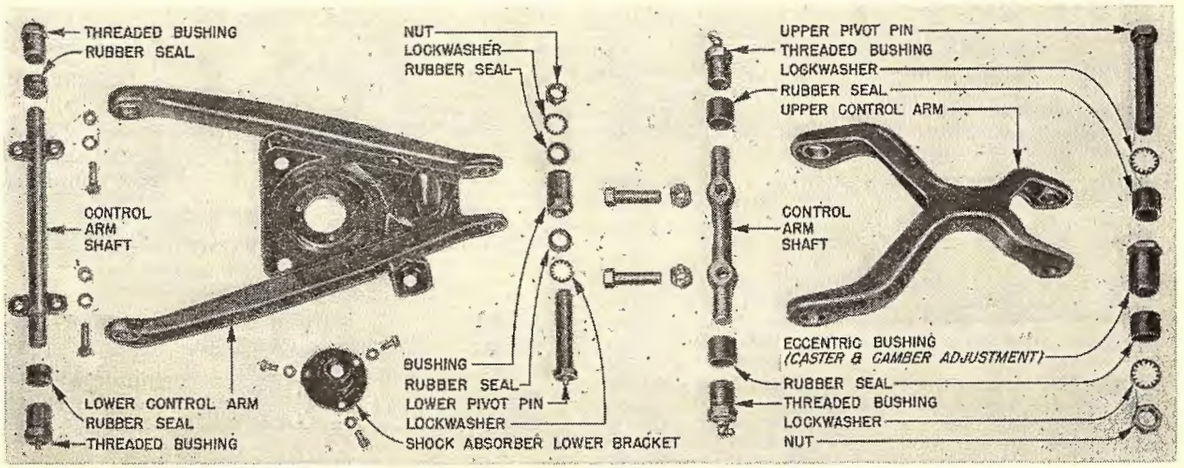
UPPER CONTROL ARM REPLACEMENT: ***Upper pivot pin and eccentric bushing can be replaced without removing control arm from car.***

Removal: Support car with jack placed under lower control arm, remove wheel and tire. Remove shock absorber and upper bracket (see Shock Absorber Replacement). Take off nut on rear end of upper pivot pin, unscrew threaded pivot pin from knuckle support and control arm (CAUTION—wire knuckle support to frame to prevent damage to brake hose). Loosen clamp bolt in knuckle support, unscrew eccentric bushing from support. Take out two bolts mounting inner control arm shaft on frame, lift off control arm and shaft assembly.

Upper Pivot Pin & Eccentric Bushing Installation: Install new rubber seal on inner face of control arm eyes (slip end of seal over boss, double other end back to allow clearance for assembly). Install eccentric bushing in knuckle support. Hold knuckle support centered in upper control arm, thread pivot pin through control arm and bushing (coat pin threads with chassis lubricant, see that one lockwasher placed under head of pin) and tighten pin against arm with 40 ft.lbs. torque, then install pivot pin nut and lockwasher and tighten nut to 40 ft.lbs. torque. Turn ends of seals back to cover pivot pin threads.

►***CAUTION—Head of pivot pin and pivot pin nut must both be securely seated against face of control arm (use more than 40 ft.lbs. tightening torque if necessary).***

Control Arm Installation: Notch on side of inner pivot shaft should face toward center of car (camber will be increased 2/3° if shaft turned over—see Camber Adjustment). Tighten pivot shaft mounting bolt nuts to 60-65 ft.lbs. torque.



PONTIAC CONTROL ARM ASSEMBLIES

Pivot Shaft Installation: Use spreader tool J-4251 to expand inner end of control arm to 7½" (measured between outer faces of arm). Position pivot shaft (with new rubber seal on each end) in control arm, lubricate shaft threads with chassis lubricant, start bushing on shaft and into eye in arm at same time, tighten bushing to 326-380 ft.lbs. torque and make certain that bushing flange firmly seated against arm. Center pivot shaft in arm (distance from shaft mounting hole center to outer face of arm should be 2" ± 3/64" at each end). Install second bushing. Remove tool and check control arm dimension (7½ ± 1/16" between outer faces of arm at pivot shaft), check pivot shaft position and center shaft by rotating it in the bushings. Check pivot shaft for freedom of movement (frictional drag of shaft should not exceed 12 lb.in.).

LOWER CONTROL ARM REPLACEMENT: ***Lower pivot pin and bushing can be replaced without removing control arm from car.***

Removal: Remove shock absorber (see shock absorber data), then proceed as for front spring removal (above). After spring removed, remove nut on rear end of lower pivot pin, unscrew pivot pin from knuckle support and control arm, lift control arm and pivot shaft assembly out.

Pivot Shaft Installation: Use spreader tool J-1052 to expand inner end of control arm to 11½" (measured between inner faces of arm). Position pivot shaft (with new rubber seal on each end) in control arm, lubricate shaft threads with chassis lubricant, start one bushing on shaft and into threads in arm at

CONTINUED ON NEXT PAGE

PONTIAC 1949-51 (Cont.)

same time, tighten bushing to 385-455 ft.lbs. torque and make certain that bushing flange firmly seated against arm. Center shaft in arm (distance from shaft mounting hole centers to inner face of arm should be 1½" ± 3/64" at each end). Install second bushing similarly. Remove tool and check control arm dimension (11½" ± 1/32" between inner faces of arm at pivot shaft), check pivot shaft position and centralize it by rotating shaft in bushings.

Lower Pivot Pin & Bushing Installation: Install new bushing in lower end of knuckle support and tighten to 250 ft.lbs. (CAUTION—Bushings must be firmly tightened and bushing shoulder must be seated against support). Position new rubber seal on each end of bushing, hold knuckle support centered in lower control arm, thread pivot pin through control arm and bushing (coat pin threads with chassis lubricant, see that one lockwasher placed under head of pin) and tighten pin against arm with 40 ft.lbs. torque, then install pivot pin nut and lockwasher and tighten nut to 40 ft.lbs. torque. Check knuckle support for centralized position (distance from end of bushing to inner face of control arm must be equal within one thread or ⅛" at each end of bushing).

KNUCKLE SUPPORT REMOVAL (For Kingpin Bushing Replacement): Take out brake backing plate mounting bolts and hang backing plate up out of the way (not necessary to disconnect brake line). Then remove upper and lower pivot pins (see Upper & Lower Control Arm replacement data).

SPRINGS: Springs have upper end flattened and lower end must be fitted in recess in lower seat. Color marks located on outside surface of spring center coil (if service springs not color marked, part number will be found on outside surface within 8" of top end measured on outer circumference).

1949-51 Spring Specifications
Synchro-mesh Trans. Cars

Car Model	Color Mark
6 Cyl. Sedans, Sedan & Bus. Coupe	Red
6 Cyl. Convertible	Gray
6 Cyl. Sta. Wgn. & Sedan Del.	Green
6 Cyl. Taxicab & Police	Red & Yellow
8 Cyl. Sedans, Sedan & Bus. Coupe	Gray
8 Cyl. Convertible	Green & Brown
8 Cyl. Sta. Wgn. & Sedan Del.	Gray & Yellow
8 Cyl. Taxicab & Police	Blue & Yellow

Hydra-Matic Drive Cars

6 Cyl. Sedans, Sedan & Bus. Coupe	Gray
6 Cyl. Convertible	Green & Brown
6 Cyl. Sta. Wgn. & Sedan Del.	Blue & Yellow
8 Cyl. Sedans, Sedan & Bus. Coupe	Green & Brown
8 Cyl. Convertible	Blue & Yellow
8 Cyl. Sta. Wgn. & Sed. Del.	Red & Yellow

PACKARD 1939-40 SAFE-T-FLEX

110 Six, All Models (1939-40)
120 Eight, All Models (1939-40)
Super Eight, All Models (1939-40)
Twelve, All Models (1939)

CHECKING & ADJUSTMENT: Car weight must be on wheels. Adjust front wheel bearings and check following points first:

Tire Inflation—Inflate all tires evenly to correct pressure.

Frame Height—Load car as indicated in table below and check height (front and rear). If heights not correct (within limits of plus or minus ¼"), replace or shim front springs (see spring data below), replace rear springs.

Front Height—Measure from floor to top of frame side rail at center-line of front spring.

Rear Height—Measure from under side of frame side rail to top of axle housing at rear of car.

Car Loads (for Frame Height Check)

Body Type	Front Seat	Rear
Coupes	300 lbs.	225 lbs.
5 Pass. Sedans	300 lbs.	375 lbs.
7 Pass. Sedans	300 lbs.	675 lbs.
Comm'l Chassis	300 lbs.	500 lbs.

Frame Heights

Model	Front Height	Rear Height
Six '39	18¾"	6¼"
Six '40	18⅝"	6⅜"
Eight '39	19¼"	6¼"
Eight 1801 '40	18¾"	6¼"
Eight 1801A '40	19¼"	6¼"
Super 8 '37-38	20⅛"	4¾"
Super 8 '39-40	19¼"	6¼"
Twelve '39	20½"	4¼"

Kingpin Inclination—1°30' (Twelve '39), 1°54' (All Others).

Front Wheels—Set in straight ahead position. Check by measuring from backing plate on each wheel to frame siderail at first rivet behind bumper (must be equal within ⅛" with intermediate steering arm on center line of car). Correct by equalizing tie rods.

Toe In: Should be 1/32-1/16" (Six '39), 0-1/16" (120 '39), 1/32-⅛", (Super Eight '39), 0-⅛" (Twelve '39), 1/32-1/16" at hub height (all '40 models).

To Adjust—Loosen tie rod clamps and turn each tie rod equally. If tie rod lengths not equal within ⅛" with correct toe in, wheels straight ahead, and intermediate steering arm on center line of car (see wheel section above), check for bent steering arm.

Caster: Should be 2½° (Comm'l. 1703A '39, 1803A, 1A '40), 1½° (Six '39-40, Eight 1701 '39, 1801, 1A '40), 0° (Eight 1702 '39, Twelve '39, ½° (Super Eight '39). Negative 1° (Super Eight '40). All specifications are plus or minus ½° except Twelve which has an allowable variation of minus ½° only.

To Adjust—Jack up front end, take out three screws in torque arm rear socket, take off two nuts at forward end of torque arm on front face of lower control arm, pull torque arm to rear until free. Install wedge shim furnished in ½° and 1° taper on torque arm with thick end up to decrease or down to increase caster, re-install torque arm. Check upper control arm pivot pin for alignment. Elongate absorber mounting holes if necessary.

Camber: 1° plus or minus ¼° (Twelve '39), ½° plus ¾° or minus 0° (All Others).

To Adjust (Six, Eight, Super 8)—Jack up front end, support wheel, remove shock absorber link bushing bolt and pilot bushing. Install proper offset pilot (furnished in four sizes—0, 1/16", ⅛", 3/16" offset to throw top of wheel out (increase camber), or in (decrease camber). Pilots may be installed with offset in either direction. 1/16" offset at pilot will change camber ⅓°. CAUTION—See that thimbles installed in both arms with offset in same direction.

To Adjust (Twelve)—Jack up front end, loosen shock absorber control arm yoke nut, install split washer between yoke and end of arm. Washers furnished ⅛", 3/16", ¼", 5/16" thick. 1/16" washer thickness will change camber 1/3°.

SERVICING: 1939-40 Control Arm Damper. Check by removing knuckle support upper pivot bolt at end of shock absorber arms and damper bolt at center of arms. Clearance between arms at damper friction disk should be .125-.135". If clearance not correct arms should be straightened or replaced. Damper tension spring pressure should be 105-115 lbs. compressed to 13/16". To assemble damper, install spring on bolt, insert bolt through arm which has larger hole, tighten nut securely so that opposite arm seated against shoulder on bolt. NOTE—This damper not used on Twelve.

Lower Control Arm Pivot Pin (Except Twelve)—Pivot pin is clamped in knuckle support and is mounted on special roller bearings in control arm ends with ball thrust bearing between knuckle support and rear arm. Bearing should be pre-loaded by installing thrust bearing shims (furnished in .001" thickness steps) between arm and support so that pull of 3-8 lbs. (1937), 1-6 lbs. '38-40) required to move upper end of knuckle support with upper pivot bolt removed (use spring scale hooked to upper end of support to check this pre-load).

Lower Control Arm Pivot Pin (Twelve)—Pivot pin mounted on special roller bearing (rear end), adjustable tapered roller bearing (front end) with ball thrust bearing between knuckle support and front control arm. Front roller bearing should be adjusted by removing bearing cap and tightening bearing nut so that 5-6 lb. pull required to move upper end of support (upper pivot bolt removed). Make certain that bearing adjusting nut locknut securely tightened and lockplate ears turned up against nuts after making adjustments. Always use new bearing cap and install with special driver to seat cap in control arm.

Model	Burnishing Bar	Finished Dia.
Six &Eight '39-40	ST-5046	.866"
Super 8 '39-40	ST-5046	.866"
Twelve '39	ST-990	1.054"

NOTE—Kingpins also furnished .005" oversize.

Lower Control Arm Inner Bushings—Lower arms mounted on rubber bushings at inner end. To renew bushings, press new bushings in place in an arbor press using special bushing drift ST-5021 (Six, Eight, Super Eight), ST-989 (Twelve). Protect bushing with special sleeve ST-5099 (Six, Eight, Super Eight), ST-2003 (Twelve) to prevent bushing collapse while it is being pressed into place. Important—Check bushing alignment.

Bushing Alignment—Bushing must be started in hole in control arm so that flatted end of bushing pin is in correct position to prevent binding or ex-

CONTINUED ON NEXT PAGE

PACKARD 1939-40 SAFE-T-FLEX (Continued)

cessive distortion of bushing when control arm installed on car. To check bushing alignment, install special dummy bolt with flatted end ST-987 (Twelve '39), ST-5102 (All Others) in bolt hole at outer end of control arm, use straightedge installed on top of flatted end of bushing pin at inner end of arm and check clearance between straightedge and flatted portion of dummy bolt at outer end of arm (dummy bolt flat will indicate center line of bolt hole). Clearance should be 9/32" (Twelve '39), Flush or no clearance (All Others).

IMPORTANT NOTE—Above gauges cannot be used on 1940 models (new types required).

Wheel Support Upper Bushing—Rubber bushing type. Bushing may be renewed without removing wheel support from car by using special puller and pusher ST-5049.

Torque Arm—Dip torque arm rubber end bushings in soap water before assembling.

SPRINGS: If frame height not correct (see above), install not more than two spacers #326836 (except Twelve), 341052 (Twelve) between upper spring cup and insulator on top of spring (if two spacers used, install insulator between spacers). Spacers are ¼" thick. If height cannot be corrected by this means, replace spring. Springs marked by 1, 2, or 3 color marks on center coils as follows:

1939 Spring Specifications

Model	Part No.	Color Marks
1700	335413	Yellow & Blue
1701	326860	Green
1701 FW	326861	Silver
1701A	326925	White & Green
1702	326880	White & Blue
1702 FW	326938	Orange
1703	335692	Red & Silver
1703 FW	338166	Yellow & Silver
1703A	338897	See Note
1705	338156	Orange & Purple
1705 FW	335990	Orange & Blue
1707, 1708	237686	Red & Yellow
1707 FW	237907	Red & Silver
1708 FW	240293	Green & White

1940 Spring Specifications

1800 Std.	348127	Yellow & Red
1801 Std.	348377	Yellow & Blue
1801 FW.	326860	Green
1803, 6 Std.	335692	Red & Silver
1803, 6 FW.	338166	Yellow & Silver
1803A Comm'l.	326925	White & Green
1804, 7 Std.	354690	Orange, Red, Blue
1804, 7 FW.	354691	Orange, Red, Purple
1805, 8 Std.	351256	Purple & Silver
1805, 8 FW.	354710	Yellow, Red, Silver

Std.—Spare at Rear. **FW.**—Fender Well cars.

1703A Note—This spring Orange, Red, Silver.

PACKARD 1941-42 SAFE-T-FLEX

'110' SIX, 1900 (1941), 2020 (1942)
'120' EIGHT, 1901, 1A (1941); 2001A, 21 (1942)
'160' SUPER EIGHT, 1903,3A,4,5 (1941)
'160' SUPER EIGHT, 2003A,23,4,5,55 (1942)
'180' CUSTOM SUPER EIGHT, 1906,7,8 (1941)
'180' CUSTOM SUPER EIGHT, 2007, 8 (1942)

NOTE: Packard Clipper—This model has new 'parallelogram' type Independent Suspension. See separate article for data on Clipper models.

PRODUCTION CHANGE NOTE: Kingpin Thrust Bearing (Six & Eight)—Special antimony-lead type thrust bearing used on first cars with roller bearings at each end of steering knuckle kingpin. These bearings changed on later cars to ball thrust bearing and bronze bushings on kingpin. Later type unit

TYPE: Independent 'Safe-T-Flex' type. Same design as used on corresponding 1940 models (see Production Change Note above for different type bearings used).

CHECKING & ADJUSTMENT: Check front wheel bearings and set wheels in straight ahead position, check following points first:

Tire Inflation—Check tires and inflate to correct pressure for each model.

Frame Height—Must be correct when checking caster and camber. To check, load car with 300 lbs. (front—all models), 225 lbs. (rear—Coupe), 375 lbs. (rear—5 Pass. Sedan), 675 lbs. (rear—7 Pass. Sedan), 500 lbs. (rear—1901A Hearse), 800 lbs. (rear—1903A Hearse). Measure from floor to top of frame side rail at front spring center-line (front) from underside of frame to top of axle housing (rear). If height not correct, install spacer or replace spring (see Springs below).

Car Model	Front—Frame Height—Rear
1900 Six	17⅝"—5⅜"
1901 Eight	18⅛"—5¼"
1901A Comm'l.	18¾"—5¾"
1903, 4, 5, 6, 7, 8	18¾"—5¼"
1903A Comm'l.	19¼"—5¾"

1942 Models—Measure from floor to frame on each side to ascertain if car is level crosswise. If these measurements not equal on both sides within 1/16-5/16", check front springs and install spacer or replace spring on low side of car (See Springs).

Kingpin Inclination:—2½° crosswise (all models). NOTE—Car weight must be on wheels when checking following adjustments.

Toe-In:—**0-1/16" (All Models).** Measure between tires 10" up from floor. When checking toe-in, first set wheels straight ahead and correct tie rod lengths, if required, as follows: Install Steering Crank Aligning Gauge ST-5105 in frame cross-channel under steering crank (gauge indicates center-line of car). See that steering gear roller on high mid-point of worm with mark on cross-shaft in line with mark on case. Adjust tie rods (lengthen one rod, shorten other rod) until distance from mark on gauge to brake backing plate is same on both sides of car. Both tie rods should be equal within ½".

To Adjust—Loosen clamp bolts and turn both tie rods equally. Tie rod lengths must be equal within ⅛" after adjusting with intermediate steering arm centered and steering wheel roller on 'high' point of worm (adjust by shortening one rod, lengthening opposite rod equally). NOTE—If tie rod lengths not equal within ½" with intermediate steering arm centered and steering gear in straight ahead position, check for bent steering knuckle arms.

Caster:—Positive ½° plus or minus ½° (1941 Six & Eight), Pos. ¼° (1942 Six & Eight), Neg. ¾° plus or minus ½° (1941 Super 8 except 1903A), Pos. 2½° plus or minus ½° (1903A), Neg. 1° 15' plus or minus ½° 1942 Super Eight).

To Adjust—Install wedge shims (furnished in ½° and 1° taper) between front face of lower torque arm and lower control arm. Install shims with thick end up to decrease caster, thick end down to increase caster. If 1° shim does not correct caster, check for bent parts. Check torque arm alignment

Camber:—½° with limits ½° to 1¼° (1941 Models), 0° with limits of plus ¾° or minus ¼° (Right Wheel), plus 1° or minus 0° (Left Wheel) for 1942 models.

To Adjust—Remove support pin linking upper control arm and knuckle support, change pilot thimbles in outer end of each upper control arm. Thimbles furnished with offset of 0", 1/16", ⅛", 3/16", ¼" and change of 1/16" in offset will change camber ⅓°. CAUTION—Make certain that thimbles installed in both arms with offset in same direction

Steering Geometry (toe-out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned 23½° (all models). No adjustment provided

SERVICING: Upper Control Arm Damper—To check, remove knuckle support upper pivot bolt at outer end of shock absorber arms and damper bolt at center of arms. Clearance between arms at damper friction disk should be .125-.135". If clearance not correct arms should be straightened or replaced. Damper tension spring pressure should be 105-115 lbs. compressed to 13/16". To assemble damper, install spring on bolt, insert bolt through arm which has larger hole, tighten nut securely so that opposite arm seated against shoulder on bolt.

Upper Control Arm Pivot Pin—Knuckle support is mounted on two Harris type rubber bushings on pivot pin at outer end of upper control arm. When installing pivot pin, tighten nut securely (bushing compression regulated by spacer sleeve on pin).

Lower Control Arm Pivot Pin—Pivot pin is clamped in knuckle support and is mounted on special roller bearings in control arm ends with ball thrust bearing between knuckle support and rear arm. Bearing should be pre-loaded by installing thrust bearing shims (furnished in .001" thickness steps) between arm and support so that pull of 1-6 lbs, required to move upper end of knuckle support with upper pivot bolt removed. CAUTION—Roller bearings are caged type and one of the two bearings must be renewed whenever pivot pin or either bearing is removed.

Lower Control Arm Frame Mounting—Arm is rubber bushed on frame bracket pin (two Harris type bushings used, bushings held by locking ring on pin at one end-washer). Bushings can be installed without using arbor press but must be aligned in neutral position (flat on pin must be in line with flat on special gauge bolt installed in hole in outer end of arm—use special gauge No. ST-5157.

Torque Arm Frame Mounting (Six, Eight, Super 8 1903, 6 Only)—Mounting at frame consists of two Harris type rubber bushings in end of arm.

CONTINUED ON NEXT PAGE

PACKARD 1941-42 SAFE-T-FLEX (Continued)

When installing torque arm, tighten mounting bolt until frame mounting bracket bottoms on bolt shoulder. NOTE—Frame mounting on other models consists of a hollow rubber ball installed on end of torque arm and clamped in frame bracket. Dip the hollow rubber ball in soap water to facilitate installation of torque arm ball.

Kingpin Bushings—See Production Change Note above. When installing the service bronze bushings, bushings should be finished to size by burnishing with Packard Burnisher ST-5046 or reamed to inside diameter of .866". Kingpins also furnished .005" oversize to compensate for worn spindle bushing holes. NOTE—When installing kingpins, adjust thrust bearing pre-load by installing shims (furnished in thickness steps of .001") so that force of 3½-5 lbs. applied at end of spindle is required to turn spindle on kingpin.

SPRINGS: Springs paint marked for identification as shown in table below. If frame height not correct, install not more than two spacers #326836 (¼" thick) between upper spring cup and insulator on top of spring (if two spacers used, install Insulator #326706 between spacers). If height cannot be corrected by this means, replace springs.

1942 Spring Specifications

Car Model	Spring Part No.
2020	362823
2021 Std.	348377
2021 F. W.	326860
2001A	326925
2003A	338897
2023	355692
2023 F. W.	338166
2004, 7	354690
2004, 7 F. W.	354691
2005, 8	351256
2005, 8 F. W.	354710
2008 F. W.	364609

F. W.—Fender Well Cars (Side Carrier).

1941 Spring Specifications

Model	Part No.	Color Marks
1900 Std.	362823	Red & White
1900T Taxicab	326860	Green
1901 Std.	348377	Yellow & Blue
1901 FW.	326860A	Green
1901 Sedan Exp. Std.	351223	Red & Purple
1901 Sedan Exp. FW.	351224	Red & Brown
1901 Coupe Exp. Std.	351225	Red & Silver
1901 Coupe Exp. FW.	351735	Orange & Yellow
1903 Std.	335692	Red & Silver
1903 FW.	338166	Yellow & Silver
1903 Exp. Std.	338269	Blue & Silver
1903 Exp. FW.	351708	Silver & White
1906 Std.	326861	Silver
1906 Exp. Std.	326861	Silver
1906 Chassis Std.	335692	Red & Silver
1906 Chassis FW.	338166	Yellow & Silver
1906 Chassis Exp. Std.	338269	Blue & Silver
1906 Chassis Exp. FW.	351708	Silver & White
1904, 7 Std.	354690	Orange-Red-Blue
1904, 7 FW.	354691	Orange-Red-Purple
1905, 8 Std.	351256	Purple & Silver
1905, 8 FW.	354710	Yellow-Red-Silver
1908 Std. (See Note)	354710	Yellow-Red-Silver
1908 FW. (See Note)	364609	Green-Red-Purple

Std.—Spare at rear. FW.—Cars with Fender Wells.
1908 Note—LeBaron Sedan & Limousine only.

PACKARD 1941-50

Clipper Eight, Model 1951 (1941)
Six, 2000, 2010 (1942); 2100, 2130 (1946-47)
Eight, 2001, 2011 (1942), 2101, 2111 (1946-47)
Eight, "2200" & "2300" Series (1948-50)
Super Eight, 2003 (1942), 2103, 2123 (1946-47)
Super Eight, "2200" & "2300" Series (1948-50)
Custom Super 8, 2006 (1942), 2106, 2126 (1946-47)
Cust. Eight, "2200" & "2300" Series (1948-50)

TYPE: Independent 'parallelogram' type with coil springs. Design not like that used on other Packard models in that torque arm not used. Lower control arm consists of a double arm pivoted on a bracket shaft bolted on the front frame cross-member near the center with the lower spring seat riveted on the arms. Spring seat also serves as a mounting for the lower rubber bumper and has a connection for the front stabilizer bar link.

CHECKING & ADJUSTMENT: Check front wheel bearings and adjust if necessary, check wheels and tires for balance and run-out, check shock absorber action. Set front wheels in straight ahead position and check following points first:

Tire Inflation (1941-47)—Inflate tires to 26 lbs. (Front—Six), 28 lbs. (Rear—Six), 28 lbs. Front & Rear (All Other Models).

Tire Inflation (1948)—Inflate tires (front & rear) to following pressures (cold):

2201 & 2211 (exc. St. Sedan), 2206, 2240	28 lbs.
2201 & 2211 Station Sedans	26 lbs.
2202, 2232, 2233	26 lbs.
2220, 2222, 2226	32 lbs.

Tire Inflation (1949-50)—Inflate all tires (cold) to 24 lbs. (except Super 8 7 Pass.), 26 lbs. (Super 8 7 Pass. only).

Frame Height—Car must be loaded or pulled down to correct riding height when checking front end specifications as follows:
Front End—3½" from lower face of frame side rail to top of lower control arm.
Rear End—5" from lower face of frame side rail to top of rear axle housing.

Kingpin Inclination: As follows:

1941-47 All Models	5°35' Crosswise
1948 2232 & 2233 Convertibles	5°35' Crosswise
1948 2226 & 2213 Custom	2°30' Crosswise
1948 All Other Models	5°50' Crosswise
1949-50 All Models	5°50' Crosswise

Caster: As listed below with correct Frame Height.

Caster Specifications

1941-47 All Six & Eight	Neg. 1° ± ½°
1942-47 All Super & Cust. Super 8	Neg. 2° ± ½°
1948 Six 2220	Neg. 2° ± ½°
1948 Six 2240 & Eight 2201, 2211	Neg. 1° ± ½°
1948 Super 8 2202, 2232	Neg. 1° ± ½°
1948 Super 8 2222	Neg. 2° ± ½°
1948 Custom 8 (All Models)	Neg. 2° ± ½°
1949-50 Eight	Neg. 1° ± ½°
1949-50 Super 8 exc. 7 Pass.	Neg. 1° ± ½°
1949-50 Super 8 7 Pass.	Neg. 2° ± ½°
1949-50 Custom 8	Neg. 2° ± ½°

To Adjust Caster—Loosen clamp bolt in upper end of knuckle support, remove lubrication fitting in front bushing at outer end of upper control arm, install Allen type wrench, special tool No. KMO-487, through lubrication fitting hole so as to engage socket in end of upper pivot pin, turn this eccentric pin clockwise to increase caster, counter-clockwise to decrease caster in complete turns only, tighten clamp bolt and re-install lubrication fitting. NOTE—This pin also controls camber and camber will be disturbed unless pin turned in complete turns only

Camber: 0° plus or minus ½° (All Models).
To Adjust Camber—Adjusted in same manner as Caster (above) except that entire range of adjustment secured in ½ turn of the eccentric pin. NOTE—This adjustment affects Caster and will be satisfactory if pin turned not more than ½ turn from point where correct caster adjustment is secured.

Toe-In:—0-1/16" (all models). Measure between tires 10" above floor. When checking toe-in, first set wheels straight ahead and correct tie rod lengths, if required, as follows: With wheels straight ahead, line up mark on steering gear case with mark on roller cross-shaft to insure roller being on high midpoint of worm, install Center Gauge J-2556 on frame cross-member, adjust tie rods (lengthen one rod, shorten opposite rod) until distance from mark on gauge to brake backing plate is same on both sides of car. CAUTION—See that steering marks kept in alignment while making this adjustment.
To Adjust Toe-In—Loosen clamp bolts on adjusting sleeve at outer end of each tie rod, turn both adjusting sleeves equally (to avoid disturbing steering gear position). Make certain that ball joint socket is horizontal or square with ball stud when tightening adjusting sleeve clamp bolts. NOTE—If correct toe-in adjustment cannot be secured by turning both tie rods equally within ½ turn (tie rod lengths equal within ½") without turning steering gear off high point of worm, steering gear pitman arm should be relocated on cross-shaft.

Steering Geometry:—With outer wheel turned exactly 20°, inner wheel should be turned 23° plus or minus ½°. No adjustment is provided. Check for incorrect Caster or bent steering arms if incorrect.

SERVICING: Knuckle Support Upper Pivot Pin & Bushings—To assemble knuckle support and upper control arm, thread eccentric pivot pin in upper end of knuckle support until larger center section is centered in support with adjusting wrench socket toward front of car (approximately two threads exposed at rear of support), install clamp bolt in support and tighten securely, install seals on each end of pin (front seal approximately ⅛" shorter than rear). Hold knuckle support centered in end of upper control arm, thread rear bushing in arm and on pin partially, start front bushing on pin, then tighten rear bushing securely to 90-100 ft. lbs. Turn front bushing in until clearance between hexagonal head of bushing and front face of control arm is 1/32", install clamp bolt in front eye of control arm and tighten this clamp bolt securely.

Knuckle Support Lower Pivot Pin—Consists of a bolt threaded through eyes at outer end of lower control arm and a bushing which is threaded in knuckle support and on the bolt. Bolt is retained by a nut on the rear end. To assemble, install bushing in knuckle support, tighten bushing to 145-155 ft. lbs. Slip rubber seal over each end of bushing, hold knuckle support and bushing centered in lower control arm, thread bolt through arm and knuckle support bushing from front, install nut and washer on rear end of bolt, snap seals down over

CONTINUED ON NEXT PAGE

PACKARD 1941-50 (Cont.)

bushing and into place on the bolt at each end of bushing. NOTE—Clearance between inner face of control arm and end of knuckle support bushing should be ⅛".

Lower Control Arm Frame Mounting Pivot Shaft—Control arm is pivoted on shaft bolted to frame cross-member by bushings which are threaded in arm and on shaft. Shaft can be removed from arm by removing bushings. New bushings cut their own thread in the arm and must be installed as follows: Install special spreader tool J-1052 between inner ends of lower control arm to maintain correct distance of 11½" (plus or minus 3/64") between inner faces of control arm while bushings being installed (expand tool until correct distance of 11½" is secured). Hold pivot shaft centered in end of control arm so that distance from center-line of frame mounting holes to inner face of arm is 1½" at each end, see that seals installed on each end of shaft. Start bushing on shaft and in arm at same time, tighten bushings securely to 145-155 ft. lbs. Check to see that arm pivots freely on shaft and that 1½" dimension at each end is maintained (shaft can be rotated to centralize it in arm).

SPRINGS: Removal & Installation—To remove spring, support car with jack under lower control arm, raise wheel 3-4" off floor, place jack stand under frame side rail, disconnect stabilizer link at lower control arm, install jack under lower control arm frame mounting bar (inner end), take out mounting bar bolts and nuts, lower jack slowly to relieve spring tension, lift spring out.

Installation. Install in same manner paying particular attention to spring marks (see Note below). Make certain that flattened (ground) end of spring is upward and centralized by four lugs on cross-member, see that lower end of spring indexes with hole in spring seat (lower end not flattened and must be properly installed in spring seat recess). **Spring Identification Note**—Springs are graded and marked by notches (Grind Marks) on end of last flat coil as follows: 2 Grind Marks—High Limit, No Grind Mark—Normal, 1 Grind Mark—Low Limit. Springs must be installed in following combinations (#1 preferred) to maintain correct frame height.

Cars Without Electromatic Clutch

Comb.	Left Side	Right Side
#1	High Limit (2 marks)	Normal (No Marks)
#2	High Limit (2 Marks)	Low Limit (1 Mark)
#3	Same on both sides.	

Cars With Electromatic Clutch

#1	High Limit (2 Marks)	Low Limit (1 Mark)
#2	High Limit (2 Marks)	Normal (No Marks)
#3	Normal (No Marks)	Low Limit (1 Mark)

Spring Height—If car sags on left front corner or frame height above floor is not equal on both sides of car within 1/16-5/16", check springs to make certain that correct springs are installed.

1942 Spring Specifications

Car Model	Spring Part No.
2000	377253
2001	373862
2003, 2006	367740

1946-47 Spring Specifications

Car Model	U. S.—Part No.	Can. & Exp.
2100	367653	387864
2101, 2111	373862	387865
2103, 2106	367740	387866
2126	387552	

1948 Spring Specifications

Car Model	Color Mark & Part No.
2201, 2, 11	Orange & Brown—395720
2232	Red—367740
2206, 33	Orange & Silver—395721
2213	Red & Purple—382980
2222, 26	Orange & Yellow—387552

1948 Export Springs

2201, 2, 11, 32	Red & White—395723
2206, 33	Brown—384857
2222, 26	Orange & Yellow—387552

PACKARD 1951

All Models (1951)

DESCRIPTION: Independent, parallelogram "Broad-Beam" type with new design Upper Support Arm and Direct Acting Shock Absorbers as follows:

Upper Support Arm—Forked type pressed steel welded assembly. Arm is pivoted at inner end on bushings threaded in the arm and on the pivot shaft which is bolted on top of shock absorber mounting bracket on frame side rail. Similar bushings are used at the outer end of the arm with a pivot pin threaded in the bushings and through the upper end of the steering knuckle support. This pin has an eccentric center section in the knuckle support and controls caster and camber. Pin is locked in the knuckle support by a clamp bolt.

Shock Absorbers—Direct acting type mounted within the coil springs. Upper end of shock absorber is bolted to mounting bracket on frame side rail and lower end is bolted to mounting plate bolted on bottom of lower spring seat on lower support arm. *NOTE*—shock absorbers can be removed without disturbing suspension system.

CHECKING & ADJUSTMENT: First check and adjust front wheel bearings, wheel and tire balance and run-out, and tire inflation. Place car on level floor and check following:

Tire Inflation: 24 lbs. Cold, Front and Rear.

Kingpin Inclination: 5°50′ crosswise.

Caster: Negative 1° ± ½° (limits Neg. ½° to Neg. 1½°).

Adjustment—Remove lubrication fitting in bushing at forward end of upper support arm outer pivot pin, use Allen wrench inserted through this hole to turn the pivot pin in **complete revolutions only.**

►*CAUTION—Pin is eccentric and will disturb camber setting unless it is rotated in full turns only.*

Camber: 0° ± ½° (limits Neg. ½° to Pos. ½°).

Adjustment—Same as for Caster (above) except that eccentric pin should be turned **not more than one-half revolution** from point where correct caster setting secured. Entire range of adjustment is secured in ½ turn of the pin.

►*CAUTION—Caster will be disturbed if pin turned more than one-half revolution.*

Toe-In: 0", plus 1/16", minus 0" (0" to 1/16" range).

Adjustment—Loosen clamp bolts at each end of adjusting sleeve at outer end of each tie rod, turn adjusting sleeves on **both tie rods** equally.

SHOCK ABSORBER REPLACEMENT: Remove nut on upper mounting stud on top of mounting bracket on frame side rail, take out two bolts in lower mounting plate under lower spring seat, withdraw shock absorber and mounting plate assembly through hole in lower spring seat. Install shock absorber in same manner.

►*CAUTION—Make certain that rubber grommets and cup-shaped washers correctly assembled on upper and lower mounting studs.*

COIL SPRING REPLACEMENT: Remove shock absorber (above) and disconnect stabilizer on side of car on which spring being removed. Raise front wheel 3-4" off floor and support car with stand under frame side rail. Place hydraulic jack under lower support arm inner pivot shaft, take out four pivot shaft mounting bolts, lower the support arm and shaft assembly until the spring is free, then lift spring out.

►*SPRING INSTALLATION CAUTION*—Flattened end of spring must be upward and end of lower coil must be seated in recess in lower spring seat so as to cover the drain hole in the spring seat.

UPPER SUPPORT ARM REPLACEMENT: Support front end on jack placed under lower support arm, remove wheel and tire assembly. Unscrew front and rear bushings on outer pivot pin. Remove clamp bolt from upper end of knuckle support, unscrew pivot pin from support. Remove two mounting bolts from support arm inner shaft, lift support arm assembly off. To remove shaft from support arm, unscrew bushing from arm at each end of shaft.

►*INSTALLATION CAUTION*—When installing inner pivot shaft bushings in arm, use Spreader Tool J-3957 to maintain arm alignment while screwing bushings in. After installing support arm on frame, hold knuckle support centered in arm while screwing bushings in arm and on pivot pin. Make certain rubber seals installed at inner end of each bushing.

LOWER SUPPORT ARM REPLACEMENT: Remove shock absorber and coil spring (see directions above). Remove nut and lockwasher from rear end of lower pivot bolt at outer end of arm, unscrew bolt from knuckle support and support arm, lift support arm assembly off. Remove pivot shaft by unscrewing bushing from arm at each end of shaft.

►*INSTALLATION CAUTION*—When installing pivot shaft bushings in arm, use Spreader Tool J-1052 to maintain support alignment. Install rubber seal at inner end of each bushing.

SPRINGS:	Part No.	Load Rating
200 exc. Convt.	395720	2040x90
200 Convt.	382374	2180x90
300 & 400	382374	2180x90

STUDEBAKER 1939 PLANAR

COMMANDER, 9A (1939)—SEE NOTE

►**1939 PRODUCTION CHANGE NOTE: Commander Model 9A**—Beginning with Serial No. 4112701, upper support arm changed to same type used on 1939 President Model (new type upper support arm frame bracket with shims for Camber adjustment located between bracket and frame.

Refer to separate Studebaker Planar Type Suspension article for data on later 1939 Commander and all 1939 Champion and President Models.

CHECKING & ADJUSTMENT:—Car weight must be on wheels. Adjust front wheel bearings and check following points first:

Tire Inflation—36 lbs.

Frame Height—Bounce car up and down several times to insure frame assuming normal position.

Kingpin Inclination—5½°.

Caster:—Should be Neg. ¼° to Pos. ¾° (all models). Caster angle controlled by front spring and is not adjustable.

Camber: Should be ¼-¾°. Controlled by eccentric upper support pin.

To Adjust—Loosen two clamp bolts in the knuckle support upper end. Install wrench on hexagonal head of support pin, move wrench toward car frame to increase, or toward wheel to decrease camber. Tighten clamp bolts. Neutral position of pin is with wrench flats vertical.

Toe-In: 3/16" (limits 1/8-7/32") for all 1936-37 models, 1/16-1/8" for 1938-39 models.

To Adjust (1938 Models & 1939 Early Commander)—Loosen clamp bolt at each end of center tie rod (between steering gear pitman arm and idler lever on frame), turn this center tie rod.
NOTE—The two reach rods (end rods) are not adjustable.

CONTROL ARM ASSEMBLY: Upper support Arm Inner Bushing—Support arm should be centered in frame brackets, straight rubber bushings pushed in from each end until they contact shoulder on arm, washer installed on outer end of bushing, and retainer screw turned up until it is tight (washer against shoulder on shaft). This will squeeze rubber out at each end forming flange at bracket. Bushings should not turn, all pivoting action being through elasticity of bushings.

Upper Support Outer Pivot Pin:—Eccentric pin clamped in upper end of knuckle support by two clamp bolts. Assembled by placing knuckle support in position in upper support arm, installing eccentric pin in support, threading support pin bushings in on pin through support arm yoke from front and rear and tightening all clamp bolts.

Lower Control Link:—Mounted on spring plate at inner end and lower end of knuckle support at outer end in rubber bushings. Coat bushings with soft soap when installing control link bolts. Draw bolt nuts down tight. Do not put grease or oil on rubber bushings.

FRONT SPRING: To Remove—Jack up front end with jacks placed under each frame side rail at rear of front wheels. Raise car approximately 3". Remove cotters, nuts and washers on outer ends of spring control link, drive bolts out (use brass drift). Remove threaded spring bolts at each end of spring. Take out 10 bolts attaching spring plate to spring retaining channel, remove plate and control link assembly. Spring may then be taken out.

To Install—See that grease retainers at each end of spring channel are in place, coat spring channel and fill spring plate with fibrous grease before installing spring. Center spring eyes in spring support of knuckle support when installing spring bolts (⅛" minimum clearance between face of spring and inner face of support when entering bolt in threaded spring bushing). See that lock is in place under spring bolt head.

STUDEBAKER 1939-46 PLANAR

CHAMPION, G ('39), 2G ('40), 3G ('41), 4G ('42)
CHAMPION, MODEL 5G (1946)
COMMANDER, 9A (1939)—SEE NOTE
COMMANDER, 10A ('40), 11A ('41), 12A ('42)
PRESIDENT, 5C ('39), 6C ('40), 7C ('41), 8C ('42)

PRODUCTION CHANGE NOTE: Commander 9A (1939). This type Suspension used on 1939 Commander model beginning with Serial No. 4112701. See preceding article for data on early 1939 cars

Steering Reach Rod Change—Reach rod outer end assemblies and inner rod have been changed and rods or parts are not interchangeable (right and left or inner and outer ends). Replacement parts must be ordered for, and installed, in correct locations as shown in table below.

CAUTION—Ball end on steering reach rod outer end assembly is larger and must be used only in this location (will cause interference if installed on inner end). Rawhide seals are used on both inner and outer end assemblies.

Steering Reach Rod Assembly

Car Model	9A, 5C	6C	10A
①R-LHC Cars	513446	513450	513450
②L-LHC Cars	513447	513451	513451
③R-RHC Cars	513448	513448	513452
④L-RHC Cars	513449	513449	513453

Reach Rod Outer End Assembly

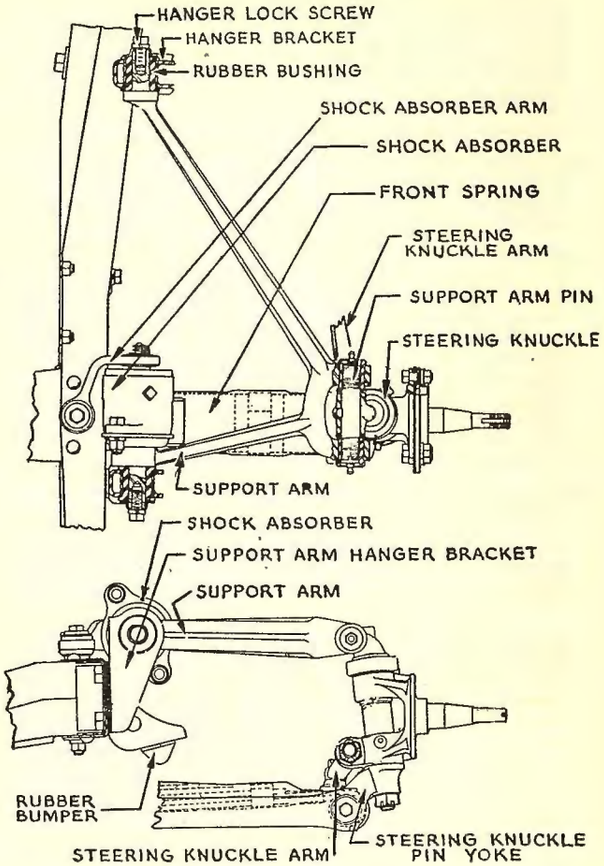
⑤R (Right Side)	513303	513303	513303
⑤L (Left Side)	513304	513304	513304

Reach Rod Inner End Assembly

⑤R (Right Side)	513305	513305	513305
⑤L (Left Side)	513306	513306	513306

①—Right Side—Left Hand Drive Cars.
②—Left Side—Left Hand Drive Cars.
③—Right Side—Right Hand Drive Cars.
④—Left Side—Right Hand Drive Cars.
⑤—Include these symbols with Part Number when ordering replacements parts.

SPECIAL SERVICE NOTE: Raising Front of Car—Whenever front end of car is raised to provide clearance for work under front end, special supports must be used so that weight properly distributed on suspension system. Use Planar Lifting Bar, Tool No. S-15, for this purpose, installing bar on jack and engaging bar under front spring.



Adjusting Tie Rod—Adjustment on early 1939 cars is made differently than on later 1939 and 1940-42 cars (center tie rod adjustable on early cars, right and left reach rods adjustable on later cars). See Tie Rod Adjustment (below) for complete instructions on each type.

TYPE: Independent 'Planar' type suspens'n with leaf type spring serving as lower control arm. Design similar to type used on previous models.

CHECKING & ADJUSTMENT: Adjust front wheel bearings, check shock absorbers, steering gear adjustment, steering arm and tie rods for looseness. Check following points first:

Frame Height—Raise and lower front end several times by grasping bumper so that frame will assume normal position.

CONTINUED ON NEXT PAGE

STUDEBAKER 1939-46 PLANAR (Continued)

Tire Inflation—Check tires and inflate to 26 lbs. front & rear (Champion '39), 30 lbs. front & rear (Comm. & Pres. '39), 26-28 lbs. (front—Champ. & Comm. '40), 30-32 lbs. (rear—Champ. & Comm. '40), 30 lbs. front & rear (Pres. '40), 26 lbs. front—(Champ. '41-46), 28 lbs. rear (Champ. '41-46), 28 lbs. front & rear (Comm. '41-42), 26 lbs. front & rear (President '41-42).

Kingpin Inclination—5½° crosswise (all models).

Caster:—5½-6½° (Champion 1939), 1-2° (Champion 1941-46), Negative ¼° to Pos. ¾° (Commander & President 1939-40-41-42). Caster angle is determined by front spring and is not adjustable.

Camber:—½° (¼—¾°) for all models.
To Adjust—Loosen upper support arm frame mounting bracket bolts, remove shims from between mounting bracket and frame to decrease camber, add shims to increase camber (shims slotted). One thin shim will change camber ¼°, thick shims are equal to four thin shims. Tighten bracket bolts securely after adjusting. CAUTION—Make certain that shim thickness equal on both mounting brackets (add or remove shims equally at each bracket when making adjustments).

Toe-in:—⅛-7/32" (Champ. '40), 1/16-⅛" (all other models).

To Adjust (Early 1939 Models)—Loosen clamp bolt at each end of center tie rod (between steering gear pitman arm and idler lever on frame) and turn this center tie rod.

To Adjust (Later 1939 Models & 1940-46 Models). Set the steering gear in the "straight ahead" position (center of travel with lever lugs on 'high' points of cam), loosen clamp bolts and turn **left hand** reach rod until left hand wheel is in straight ahead position (parallel to rear wheel). Then loosen clamp bolts and turn **right hand** reach rod (between steering idler arm and right hand wheel) to adjust toe-in. CAUTION—Toe-in adjustment must be made exactly as detailed above to insure correct steering gear position.

Steering Geometry (toe-out on turns):—With outer wheel turned exactly 20°, inner wheel should be turned 22½-23° (Champion), 22-22½° (Commander and President). No adjustment provided. Check for bent steering arms if specification incorrect.

SERVICING: Support Arm & Steering Knuckle Removal—Disconnect reach rods at steering arms. Support front end of car, remove spring bolt (lower pivot pin) by unscrewing bolt from lower steering knuckle yoke, spring eye, and lower control link. Take out two bolts mounting front shock absorber on upper control arm, take out shock absorber arm bolt in frame rail, remove shock absorber. Remove screws and washers on inner ends of upper control arm which retain frame mounting bracket rubber bushings, loosen control arm front frame bracket, remove shims from between bracket and frame (these shims control Camber and exact same number must be re-installed to avoid disturbing camber adjustment), slip frame bracket off control arm bushing and remove. Disengage steering knuckle lower yoke from spring eye, shift entire assembly forward to free upper control arm from rear frame mounting bracket bushing, remove assembly from beneath car.

Installation—When installing assembly on car, dip rubber bushing in gasoline before installing bushing in frame suport bracket (CAUTION—Oil, soap or hydraulic brake fluid must not be used on bushings as this will allow bushings to turn in brackets in service). Make certain that correct shim pack installed between support bracket and frame (re-install same shims removed when bracket taken off). See that steering knuckle lower yoke centered on spring eye (equal clearance at each side) when installing spring bolt. Hold control arm in horizontal position while tightening control arm screws at frame bracket (to insure proper position of rubber bushings in frame bracket).

Steering Knuckle Assembly:—Lower yoke is press fit on end of steering knuckle pin and must be removed and installed in an arbor press. To dismantle steering knuckle assembly, drive out taper lock pin in upper end of steering knuckle pin (this pin locks upper control arm pin in knuckle), remove pin bushings and pin, remove upper control arm. Remove nut and cotter pin from lower end of knuckle pin, press knuckle pin out of lower yoke, remove yoke and knuckle pin from steering knuckle.

Steering Knuckle Bearings—Knuckle pin mounted on needle bearing (top), bushing (bottom) with ball thrust bearing between upper end of pin and steering knuckle (endplay adjustment shims installed between bearing and knuckle). Use special Arbor, No. J-1294 (Champion), J-1277 (Commander & President—with sleeve), to press out bushing and needle bearing. Install new bushing first on Champion (bushing need not be reamed), then install spacer tube (oil holes in spacer and knuckle must line up), and needle bearing using arbor J-1294 to press bushing and needle bearing in place. On Commander & President, install bushing and needle bearing in same order (no spacer tube used) using arbor and sleeve J-1278. When installing knuckle pin, check endplay as follows:

Thrust Bearing & Endplay Adjustment—Install knuckle pin and thrust bearing in steering knuckle, check endplay which should be .003-.006" by placing feeler gauge on lower face of knuckle. Face of feeler gauge should be flush with edge of shoulder on steering knuckle pin. Add or remove shims between thrust bearing and upper face of steering knuckle to secure this desired endplay of .003-.006".

Upper Control Arm Pivot Pin—Before installing upper control arm pivot pin bushings, measure outside dimension of yoke at outer end of control arm with .010" feeler under one leg of caliper gauge (dimension will be total width plus .010"). Then use special spreader tool, No. J-1524 installed on outer end of control arm yoke to spread yoke exactly .010" so that caliper is snug on yoke without feeler gauge. With arm spread in this manner, assemble knuckle pin and pivot pin in control arm yoke, install bushings. After bushings have been tightened securely, remove spreader. See that taper lockpin installed in upper end of knuckle pin to lock pivot pin in place.

SPRINGS: Front spring is transverse leaf type. Spring eye is formed in main leaf and second leaf is wrapped around eye for additional strength.

STUDEBAKER 1947-49 PLANAR

Champion, 6G (1947), 7G (1948), 8G (1949)
Commander & Land Cruiser, 14A (1947), 15A (1948) 16A (1949)

►CHANGES & CORRECTIONS

►***1947-48 PRODUCTION CHANGES: Due to production changes as listed below, indicated parts not interchangeable on cars produced before and after these changes. Serial number should be noted when ordering these parts:***

►**Champion 7G (1948) Steering Knuckle & Wheel Bearing Change:** Following parts changed at Serial No. G-337,462 (South Bend) and **not interchangeable with parts on earlier cars:** Steering Knuckle (Right & Left), Front Wheel Hub and Drum (Right & Left), Inner & Outer Wheel Bearing Assemblies (Bearing Cup, Cone & Rollers), Brake Drum Oil Catcher, Felt Grease Washer & Retainer Assembly.

►**Commander 14A (1947) Caster Change:** Caster changed to —2° to —3° beginning with following numbers:
Comm. 14A—Serial No. 4,276,243 (South Bend) & 4,819,208 (Los Angeles).
Comm. 14A Convertible—4,276,102 (South Bend).
Land Cruiser 14AY—4,276,053 (South Bend), & 4,819,188 (Los Angeles).
Other Cars—Following cars also have new Caster specification: 4819196, 4819200, 4819201, 4819177, 4819180, 4819185.

►**Commander 14A (1947) Front Suspension Parts Change:** At same time Caster changed (see above) parts listed below were changed and are **not interchangeable with parts used on earlier cars:** Steering Knuckle (Right & Left), Steering Knuckle Shims, Steering Knuckle Arm (Right & Left), Steering Knuckle Upper Bushing (Early Cars) and Bearing Rollers (Later Cars), Steering Knuckle Upper Control Arm Support (Right & Left), King Pin (Right & Left), and King Pin Thrust Bearing.

DESCRIPTION: Planar type independent suspension with transverse spring. Design changed from type used on 1946 Champion and previous Studebaker models.

CHECKING & ADJUSTMENT: Check front wheel bearing adjustment, tire inflation pressure, steering gear adjustment, shock absorber action, and steering linkage. Then check front suspension as follows:

Tire Inflation Pressures: For each tire size (Cold):
Champion—(5.50x15 & 5.50x16) 30 lbs. Front, 28 lbs. Rear. (6.00x15) 28 lbs. Front, 26 lbs. Rear. (6.40x15) 28 lbs. Front, 24 lbs. Rear.
Commander—(6.50x15) 26 lbs. Front, 22 lbs. Rear.

Kingpin Inclination—5½° crosswise.

Camber: (1947-48) ½° plus or minus ¼°.
(1949) 0° to Pos. 1° with ½° greater camber for left wheel than for right wheel.
Camber is controlled by number and thickness of slotted shims installed between each upper control arm bracket and frame.
To Adjust—Loosen upper control arm mounting bracket bolts, add shims (to increase camber), remove shims (to decrease camber) **equally at each bracket.** One thin shim will change camber approximately ¼° (thick shim equal to 4 thin shims).
CAUTION—Number and thickness of shims at each control arm bracket must be kept equal.

Caster: Not adjustable. Incorrect caster indicates bent parts or incorrect assembly (kingpin support not properly centered in control arms etc.).

CONTINUED ON NEXT PAGE

STUDEBAKER 1947-49 PLANAR (Continued)

►*PRODUCTION CHANGE NOTE—See 1947-48 Production Change Note for new parts and changed specifications.*

Caster Specifications

1947-48 Champion 6G & 7G.....0° to Pos.1°
1949 Champion 8G.....Pos. ½° to Pos. 1½°
1947 Early Comm. & Land Cr. 14A.....0° to Pos. 1°
①1947 Later Comm. & Land Cr. 14A....Neg. 2° to Neg. 3°
①1948 Comm. & Land Cruiser 15A.....Neg. 2° to Neg. 3°
1949 Comm. & Land Cr. 16A.....Neg. 2° to Neg. 3°

①—See 1947 Production Change Note for Serial Nos. at which this change made.

Toe In: 1/16-⅛". Do not adjust toe-in until wheels correctly positioned and entire steering linkage checked and adjusted as follows:

►**1947-48 Adjustment Procedure:**

1). Left Hand Tie Rod Adjustment—Place steering wheel in straight-ahead position with cam lever studs on "high" points of cam, then line up left front wheel by stretching string between front and rear bumpers so that string contacts 1⅛" block (Champion), ½" block (Commander) placed against side of tire on rear wheel, adjust **left hand** tie rod so that front tire contacts string at front and rear of wheel, tighten tie rod clamp bolts. CAUTION—Do not disturb wheel position or this tie rod setting during remander of adjustment.

2). Center (Auxiliary) Tie Rod Adjustment—Adjust rod so that over-all length between centers of ball ends is equal to distance from lubricant fitting in auxiliary steering arm support to center of steering gear cam lever shaft (Champion), or to distance between lubricant fittings on the two steering bell-cranks (Commander), tighten tie rod clamp bolts.

3). Toe-In (Right hand Tie Rod) Adjustment—Adjust right hand tie rod so that right wheel toed-in correct amount (1/16-⅛") with left wheel straight-ahead (see 1) above), tighten tie rod clamp bolts. CAUTION—On Champion, all tie rod clamp bolts must be positioned so that they are horizontal and below tie rods to prevent interference.
Right-hand Drive Car Note—Reverse above directions for toe-in adjustment on these cars (set right hand tie rod first, adjust toe-in at left hand tie rod).

►**1949 Adjustment Procedure:**

(1) Left Hand Tie Rod—Set steering wheel in center "straight-ahead" position with levers on high mid-points of cam. Adjust left hand tie rod so that left wheel points straight ahead.

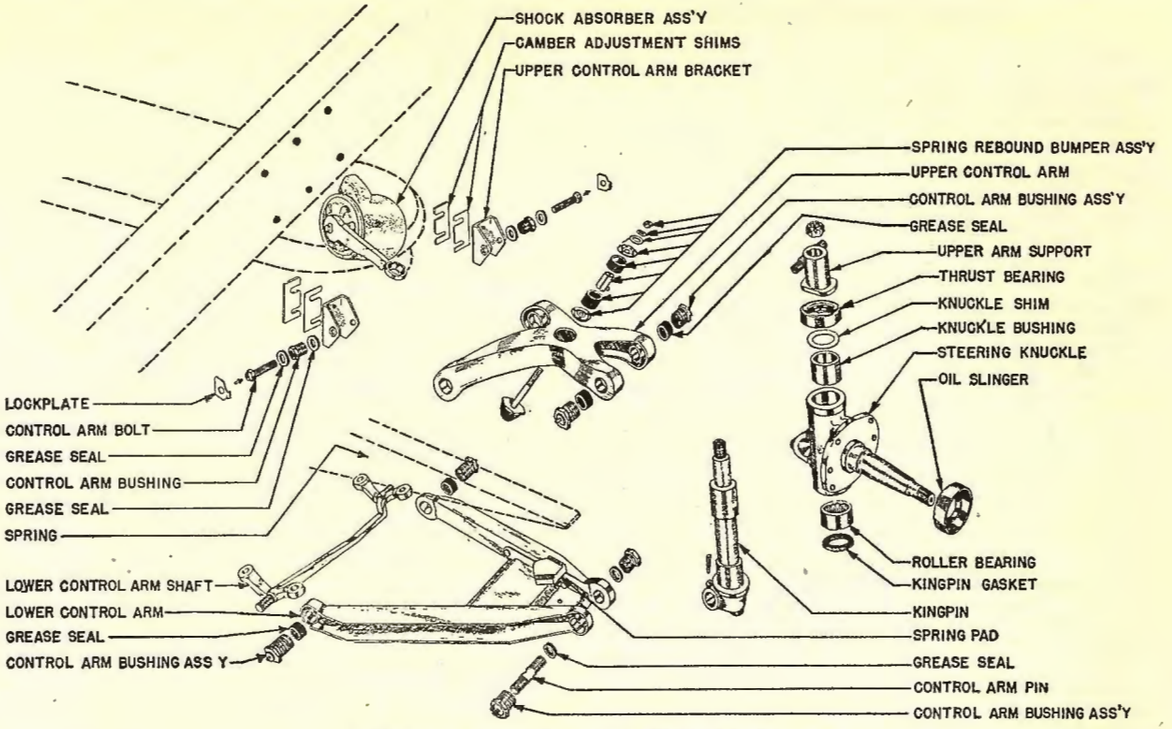
(2) Right Hand Tie Rod—Adjust right hand tie rod to same length as left hand rod (on Champion, measure between ball stud centers at ends of rod; on Commander, measure between lubricant fittings on ends of rod).

(3) Center (Auxiliary) Tie Rod—Adjust toe-in by loosening clamp bolts and turning this center rod.

Steering Knuckle Stopscrew Setting—Adjust stopscrews for correct clearance with full right and left hand turns on each model as follows:

Champion—⅛" clearance between left hand backing plate and control arms for full left turn, ⅛" clearance between steering gear arm and frame on full right turn.

Commander—⅛" clearance between backing plate and control arms for full right and left turns.



STUDEBAKER PLANAR FRONT SUSPENSION

SPRINGS: Front spring is transverse leaf type with spring cover. Spring does not have conventional eyes (ends rest on spring pads on lower control arms). Removal and installation of spring requires special procedure and tools as follows:

Spring Removal: Raise front end of car, remove wheel and tire assembly, unhook outer end of one outer tie rod from steering arm. Place spring unloader puller plate (HM-925-19) across top outer end of front frame cross-member, attach puller arms and nuts (HM-925-17). Place guide plate center pad (HM-925-18) on underside of spring directly below puller plate, hook puller (HM-925) to puller arms. Tighten puller to compress spring until lower control arm relieved of spring pressure, take out four bolts in lower control arm inner shaft, swing control arm down out of the way. Remove six bolts mounting front spring plate on front frame cross-member. Relieve spring tension and remove puller. Slide spring out over opposite lower control arm inner shaft. Remove front spring plate from spring by taking off nuts on four U-bolts.

Spring Installation—Install spring by reversing removal directions above and note the following points: Tighten nuts on U-bolts just enough to hold spring plate in place on spring. With spring in place under car, align two holes in spring plate with two holes in cross-member nearest lower control arm which is assembled to cross-member (use two punches). Compress spring using puller assembly, install all six bolts mounting front spring plate on front cross-member. After connecting lower control arm and removing puller, and **with car weight on wheels**, tighten the four U-bolt nuts to 75-80 ft. lbs. (Champion), 80-85 ft. lbs. (Commander).

1947-49 Spring Specifications

Car Model	Spring Part No.
Ch. 6G ('47) Std. (10 Leaf) ①	520045
Ch. 6G ('47) Std. (11 Leaf) ②	520046
Ch. 6G ('47) Heavy Duty (11 Leaf)	520046
Ch. 7G (Early '48) Std. (10 Leaf) ①③	523775
Ch. 7G (Early '48) Std. (11 Leaf) ②⑤	523776
Ch. 7G (Later '48) Std. (10 Leaf) ①④	525146
Ch. 7G (Later '48) Std. (11 Leaf) ②⑥	525148
Ch. 7G (Early '48) Heavy Duty ⑤	523776
Ch. 7G (Later '48) Heavy Duty ⑥	525148
Ch. 8G ('49) Std.	525616
Ch. 8G ('49) Heavy Duty	525148
Comm. All exc. Convt. ('47-48-49) Std.	525154
Comm. Convt. ('47-48-49) Std.	525153
Land Cruiser ('47-48-49) Std.	525154
Comm. & Land Cr. ('47-48-49) Heavy Duty	525153

①—Std. with 5.50x15 Tires.
②—Std. with 5.50x16 & 6.00x15 Tires.
③—Before Serial No. G-374479 (South Bend), and G-835852 (Los Angeles).
④—After ③ Serial Nos. above.
⑤—Before Serial No. G-378304 (South Bend), and G-835852 (Los Angeles).
⑥—After ⑤ Serial Nos. above.

1950-51 STUDEBAKER

ALL MODELS (1950-51)

DESCRIPTION: Independent, parallelogram type with coil springs. Shock absorbers are direct acting type mounted within coil spring (except 1950 Commander—Rotary type).

CHECKING & ADJUSTMENT: First check (and adjust if necessary) front wheel bearings, steering gear, shock absorber action, steering arm and tie rod ends for looseness. Inflate tires to correct pressure. Place car on level floor when checking following specifications:

Tire Inflation: Different tires used on each model.
Champion (1950-51)—26 lbs. Front, 24 lbs. Rear.
Comm. (1950)—24 lbs. Front, 20 lbs. Rear.
Comm. (1951)—26 lbs. Front, 22 lbs. Rear.

Kingpin Inclination: 5¼° crosswise. Check camber if kingpin inclination not correct.

Caster: ***CAUTION—All models not set alike.***
Champion (1950)—Neg. ½° (limits 0° to Neg. 1°).
Champ. (1951) & Comm. (1950-51)—Neg. 2° (limits Neg 1½° to Neg. 2½°).

CAUTION—Variation between wheels should not exceed ¾°.

Adjustment—Loosen clamp bolt in kingpin (knuckle support) at upper control arm pivot pin, remove lubrication fitting from front bushing of upper control arm outer pivot pin, insert Allen wrench through fitting hole and turn pivot pin until exact caster setting secured. Then adjust camber.

►***CAUTION—Camber will be disturbed by caster adjustment unless pivot pin rotated in complete turns only.***

Camber: 0° to Positive 1° (all models).

►***CAUTION—Manufacturer recommends ½° more camber on driver's side of car than on opposite side.***
Adjustment—After adjusting Caster (above), rotate pivot pin not more than ½ turn in either direction to secure correct camber. Recheck caster after camber adjusted (caster will be slightly changed but should be within limits specified).

►***CAUTION—Entire range of camber adjustment secured within ½ turn of pivot pin.***

Toe-In: 1/16/ to ⅛" (all models).

►***CAUTION—Tie rods must be adjusted in following order when making toe-in adjustment.***
(1) Left Hand Tie Rod (Wheel straight-ahead position). Turn steering wheel so that cam lever shaft is on "high" mid-point of cam (midway between end positions). If steering wheel spokes not horizontal in this position, remove and reposition wheel on shaft. Check left hand front wheel for straight ahead position by stretching string between front and rear bumpers on left side of car with 1 7/32" block (1950 Champion), ¾" block (1950 Commander), 1¼" block (All 1951 models) between sidewall of rear tire and string to compensate for difference in tread of rear wheel. If string does not contact tire sidewall at front and rear of front wheel, **adjust left tie rod** as required until wheel points straight ahead.

(2) Right Hand Tie Rod (Toe-In adjustment)—Without disturbing position of left hand wheel, check toe-in and **adjust right tie rod** for correct **1/16-1/8" toe-in.**

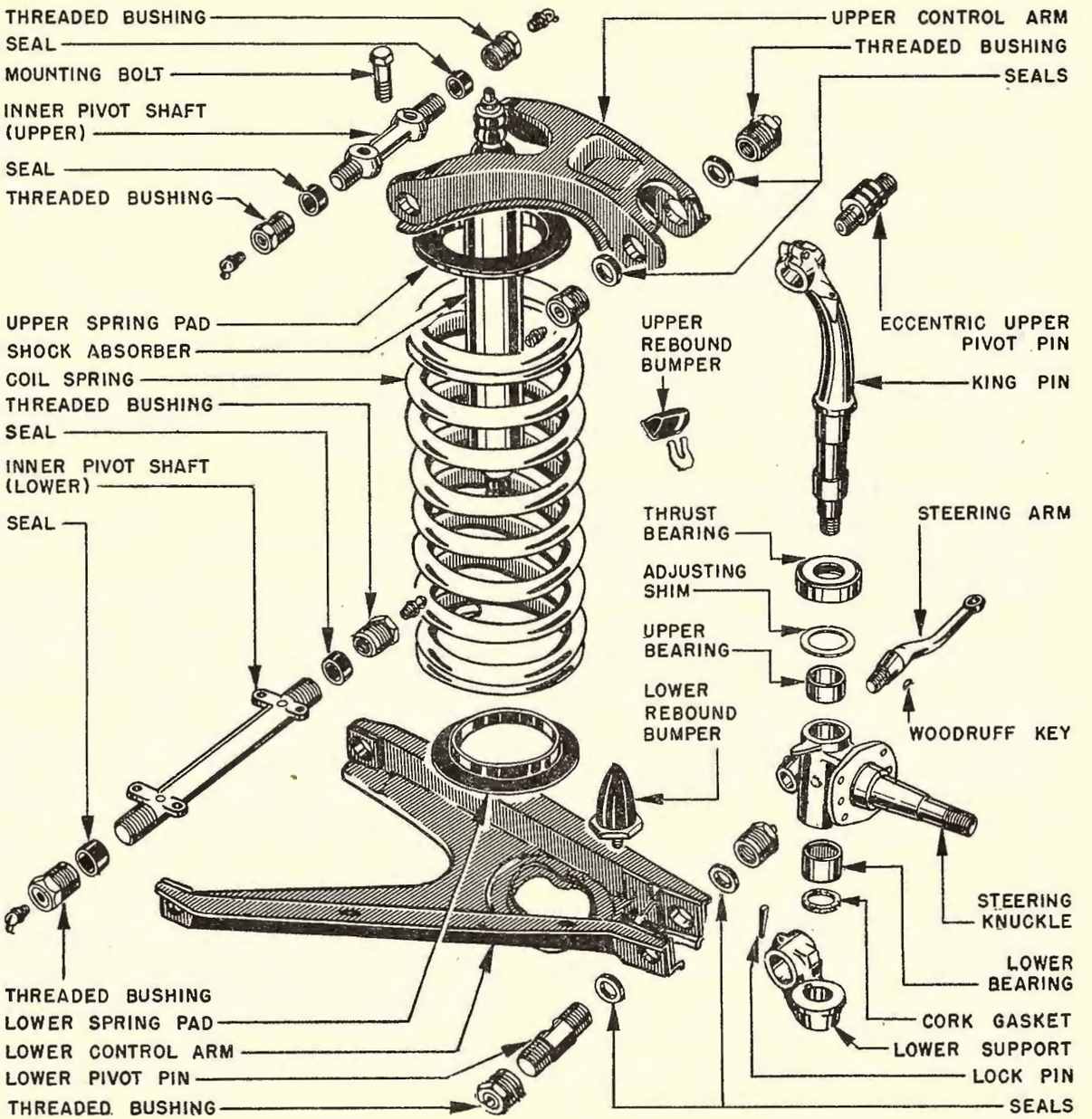
►***RHD. CAR NOTE***—On right hand drive cars, reverse above instructions, setting right wheel in straight ahead position, and adjusting toe-in on left wheel.

Toe-out on Turns: With outer wheel turned exactly 20°, inner wheel should be turned 23½° + 1°. No adjustment. Check for bent steering arm if incorrect.

SHOCK ABSORBER REPLACEMENT: Can be removed and installed without disturbing other parts of front suspension system as follows:

Champion (1950-51), Commander (1951): Remove locknut and retaining nut from shock absorber upper mounting shaft using wrench on flats on end of

CONTINUED ON NEXT PAGE



1950-51 STUDEBAKER FRONT SUSPENSION ASSEMBLY
(See Text for 1950 Commander Differences)

1950-51 STUDEBAKER (Cont.)

shaft to prevent shock absorber turning (these nuts located on top of upper mounting bracket within arch of upper control arm). Lift off grommet retainer, rubber grommet and grommet seat. Remove the nuts from the bolts retaining lower mounting plate on underside of lower control arm, pull shock absorber and mounting plate down and out of spring as an assembly. Install shock absorber in same manner using care that rubber grommets, grommet seats and retainers correctly installed on upper and lower mounting shafts.

Commander (1950): Remove shock absorber link nut at lower end of link arm (on inner side of frame side rail), free link from bolt and remove washers, rubber grommets, spacer, and grommet retainers (CAUTION—note location of these parts to insure re-installation in same order). Remove two bolts mounting shock absorber on end of upper control arm, remove shock absorber and cork grease seal. Install shock absorber in same manner.

COIL SPRING REPLACEMENT: To remove spring, raise front end of car and support it on jacks under frame side rails to rear of engine support cross-member. Place a hydraulic jack under mounting shaft at inner end of lower control arm. Disconnect stabilizer shaft at lower control arm, remove rubber bumper from arm (to prevent interference with spring). Remove front shock absorber (except on 1950 Commander—see Shock Absorber Replacement above). Take out four bolts mounting lower control arm shaft on cross-member (jack will hold arm in place), lower the jack until spring tension is relieved, remove jack, swing lower control arm out of the way, remove spring. Remove upper and lower spring pads. Install spring in same manner.

LOWER CONTROL ARM REPLACEMENT: 1950 and 1951 arms not identical but service operations are the same on both types.

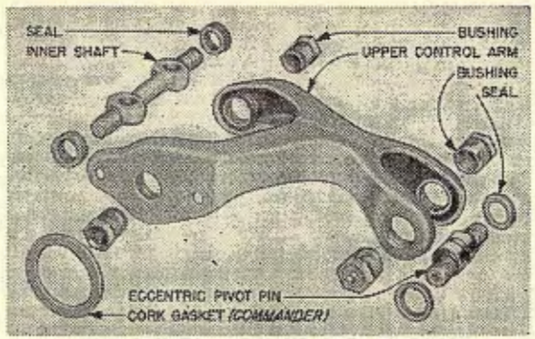
Removal: Remove shock absorber and coil spring (see data above). Unscrew threaded bushings from outer end of control arm, drive out lockpin in lower support which locks pivot pin, then drive pivot pin out of support and lower control arm (CAUTION—use brass drift to avoid damaging pivot pin). Remove lower control arm and inner shaft assembly, clamp assembly in vise, unscrew inner shaft bushings, remove inner shaft and seals from arm.

Pivot Shaft Installation: Install new seal on each end of pivot shaft and position shaft in end of control arm. Use spreader tool J-2043 (1950), J-4677 (1951) installed on inner end of control arm to spread arm .015" (turn tool up finger tight, then turn 1/2 turn additional which will spread arms .015"). Hold shaft centered in arm and install bushings, tighten bushings to 170 ft. lbs. minimum torque. Remove tool and check to see that arm turns freely on shaft.

Pivot Pin Installation: Outer end of control arm must also be spread .015" when installing bushings (see Control Arm Reassembly following).

Reassembly & Installation: Establish desired dimension at outer end of control arm by measuring between outer faces of arm with calipers **with .015" feeler** placed between arm and one leg of calipers, lock calipers for use in checking arm after spreading. Position arm on lower end of knuckle support, install pivot pin in support with new seal on each end of pin, align slot in pin with lock pin hole in support (end of pin slotted for screwdriver blade), install lock pin. Use spreader tool J-2044 to spread outer end of arm until calipers just slip over arm **without the .015" feeler gauge.** Install bushings and tighten to 170 ft. lbs. minimum torque. Remove tool and check to see that arm turns freely on pin.

UPPER CONTROL ARM REPLACEMENT: ***1950 and 1951 arms not identical but service operations are similar for both types.***



1950 UPPER CONTROL ARM ASSEMBLY

Removal: On 1950 Commander, disconnect shock absorber arm from frame bracket. Support car on jack under outer end of lower control arm. Remove wheel and tire. Unscrew both threaded bushings from outer end of control arm. On 1950 models, remove clamp bolt in upper end of knuckle support and remove the pivot pin (not necessary on 1951 cars where arm can be maneuvered off over ends of pin). Mark top front end of inner pivot shaft to insure re-installation in same position, take out shaft mounting bolts and washers, lift control arm and shaft assembly off car. Clamp control arm in vise. On 1950 Commander, take out mounting bolts and remove shock absorber and cork gasket from arm. On all models, unscrew both pivot shaft bushings, lift out pivot shaft and seals.

Pivot Shaft Installation: Install new seal on each end of pivot shaft and position shaft in control arm. Use spreader tool J-3957 (with adapter blocks J-3957-7 & J-3957-8 on 1951 cars). On 1950 cars, tighten tool hand-tight and then turn tool hex one additional complete turn to spread arm .090". On 1951 cars, tighten tool hand-tight and then turn tool hex 1/3 (two flats) additional turn to spread arm .015". Hold shaft centered in arm with marked end in same relative position as originally, install both bushings, tighten bushings to 170 ft. lbs. minimum torque. Remove tool and make certain arm moves freely on shaft.

Pivot Pin Installation: Outer end of control arm must also be spread .015" when installing bushings (see Control Arm Reassembly following).

Reassembly & Installation: Install control arm and pivot shaft on frame making certain that shaft installed in exactly same position as originally (in accordance with marks made before removal). Spread outer end of control arm .015" using Spreader Tool J-2044 and calipers in same procedure as for lower control arm (see Lower Control Reassembly & Installation above). Insert pivot pin in upper end of knuckle support (hexagonal socket for adjusting wrench toward front of car) with new seal on each end of pin, align clamp bolt groove in pin with hole in support, install clamp bolt and tighten securely. Hold knuckle support centered in control arm, install bushings, tighten bushings securely to 170 ft. lbs. minimum torque. On 1950 Commander, install shock absorber making certain that cork gasket is in place, connect shock absorber arm link to frame bracket.

SPRINGS: Springs are installed with rubber pad in spring seat recess in front cross-member (upper) and lower control arm (lower).

Spring Identification—Springs are paint marked (solid color or across two center coils) for identification as listed below. Heavy duty springs are marked similarly.

Spring Specifications

Car Model	Free Length③	Color Mark & Part No.
Champ. ('50-51) Std.	14¼"	①Black—526120
Champ. ('50-51) H.D.	14¼"	②Yellow—526122
Comm. ('50) Std.	15½"	Red—526121
Comm. ('50) H.D.	15"	White—526123
Comm. ('51) Std.	14½"	Green—526124
Comm. ('51) H.D.	14½"	Blue—526125

①—Solid Black with no color marking.
②—Solid Black with additional Yellow color mark.
③—Plus or minus 5/32".

WILLYS PLANADYNE

4 Cyl. Sta. Wgn. 4-63 (1946-51), 473SW (1950-51)
6 Cyl. Sta. Wgn. 6-63 (1948-51), 673SW (1950-51)
4 Cyl. Jeepster, VJ-2 & 3 (1948-50), 473VJ (1950-51)
6 Cyl. Jeepster, Model 673VJ (1950-51)
Sedan Delivery 4-63 (1946-50), 473SD (1950-51)

►CHANGES, CAUTIONS, CORRECTIONS

►**REPLACEMENT SPRING CAUTION (4-63 & 6-63):** Manufacturer recommends that whenever front spring replacement required, special **Heavy Duty Spring** be installed on assumption that car is subjected to overloads or operated on rough roads. When these springs installed, other parts should also be installed as follows:

Replacement Spring Parts

Heavy Duty (Export) Front Spring	No. 646855
Spring Clip (2 required)	No. 646813
Spring Bumper (2 required)	No. 645763
Spring Clip Plate (2 required)	No. 641020
Front Shock Absorber	See Note

Shock Absorber Note (4-63)—On cars before Serial No. 27465, original shock absorbers should be replaced with later type, No. 645606 or 647202, longer stroke type when this heavy duty front spring installed (original type shock absorbers have shorter travel and will not operate satisfactorily with the new spring). NOTE—Model 4-63 cars after Serial No. 27645, and all Model 6-63 cars, have long stroke shock absorbers and these need not be replaced if in good condition.

►**TOE-IN CAUTIONS TO PREVENT UNDUE TIRE WEAR:** Excessive tire wear may be caused by incorrect toe-in due to following causes:

Bent Tie-Rods—May be caused by tie rods contacting rails of "free-wheel type" lift and weight of wheels hanging on tie rods in this position.

CAUTION—Wheels should be blocked up when car raised on this type lift.

Incorrect Toe-In Adjustment Procedure—Toe-in changes with load and must be set exactly as specified under Toe-in below.

►**KNUCKLE SUPPORT INSTALLATION CAUTION:** on right & left side similar in appearance but must **not be interchanged** (results in wrong camber causing unstable steering). These parts marked for identification as follows:

Left Knuckle Support—Has part number—641026 (early cars) or letter "L" stamped on front face at center (later cars).

Right Knuckle Support—Has part number—641027 (early cars) or letter "R" stamped on front face at center (later cars).

DESCRIPTION: Planadyne independent suspension with transverse spring serving as lower control arm (spring is "Dow" type with second leaf wrapped around spring eye in main leaf for safety). Short upper control arm is mounted at frame end on rubber bushings (movement of arm on frame bracket shaft permitted by flexing of rubber bushings). Direct acting type shock absorber is linked to spring pivot pin (lower end) and special mounting stud at midpoint of upper control arm (upper end).

CHECKING & ADJUSTMENT: Check front wheel bearing adjustment, tire inflation pressure, steering gear adjustment, shock absorber action, and steering linkage for correct adjustment and freedom of movement first, then check front suspension system as follows:

Tire Inflation: Check and inflate each size tire as follows:
(6.00x15 & 6.50x15)—24 lbs. frt., 28 lbs. rear.
(6.70-15)—20 lbs. front, 24 lbs. rear.

Kingpin Inclination: 5° crosswise.

Caster: 1°. No adjustment (determined by design of front suspension units—correct by replacing necessary parts).

Camber: 1½° (1¼-1¾°). Controlled by shims under each control arm mounting bracket.

►*CAUTION*—Number and thickness of shims under both brackets on same side of car must be equal.
To Adjust—Loosen upper control arm frame bracket mounting screws, remove shims from between bracket and frame (to decrease camber), add shims (to increase camber) **equally at each bracket.** Shims are furnished in thicknesses of .060" and .120" and are slotted to facilitate adjustment (bolts need not be completely removed).

Toe-In: 1/16-1/8" at curb weight (car ready for road with full tank of fuel and spare tire, but without load).

►***CAUTION—Toe-in varies slightly with load and should be checked and adjusted exactly as follows:***

To Check Toe-In: Jack up front wheels, chalk center of tread over entire circumference of both front tires, use pencil to scribe a line at exact center of tread over entire circumference of tires (hold pencil on steady rest while rotating tire). Turn wheels to straight ahead position with steering gear on high midpoint of cam and steering wheel spoke parallel to windshield, lower car so that weight rests on wheels and load or weight down the front end of the car so that the **front spring main leaf is flat** (measure with straightedge below leaf). Roll car forward and backward to allow all parts to assume natural position. Check distance between marks on tires at front and rear of wheels and adjust to ZERO TOE-IN (equal distances at front and rear) under these conditions. NOTE—With toe-in set at ZERO under above loading conditions, toe-in will be 1/8-3/16" when load removed (dependent on arch of front spring).

To Adjust Toe-In: Loosen clamps on adjusting sleeve on each tie rod and turn adjusting sleeves on **both tie rods equally** when setting toe-in.

SPRINGS: ***CAUTION—See "Replacement Spring Caution" above for recommended replacement spring and other changes necessary when this spring installed.***

Standard Spring—"Dow" type with rubber inserts in forged cups at ends of spring leaves (spring movement flexes these rubber inserts).

►***CAUTION—Do not lubricate "Dow" type springs.***

Heavy Duty (Export) Springs—Not "Dow" type (no rubber inserts) but spring assembled with graphited compound between spring leaves. Both first and second leaves are wrapped around spring eyes for greater safety, and four additional clips are used to distribute rebound stress of main leaf throughout spring. NOTE—This spring is recommended as replacement for standard spring above.

►***CAUTION—Do not lubricate this type spring (will thin out graphite compound and allow this to work out from between leaves).***

SUSPENSION ASSEMBLY: When disassembling suspension system for renewal of parts, assemble as follows:

Upper Support Arm & Knuckle Support: Upper support arm is mounted on rubber bushings at inner (frame) end and on pivot bolt threaded through eyes in arm and in bushing in knuckle support at outer end.

Frame Support Bushings—Install bushing half in each side of frame bracket, install plain washer, lockwasher, and nut on support arm bar, tighten nut securely (shoulder on bar limits compression of rubber bushings).

Knuckle Support Pivot Bolt—Install threaded bushing in support with head toward front, tighten bushing to 175 ft. lbs. Place rubber seal on each end of bushing, hold knuckle support centered in end of support arm and thread pivot bolt in from front through support arm eye and knuckle support bushing, install nut on rear end of bolt and secure with cotter pin.

Knuckle Support & Spring Pivot Bolt: When installing support on car, hold support centered on spring eye while installing pivot bolt.

►***CAUTION—Knuckle support must be centered on spring (at bottom) and on support arm (at top) to insure correct Caster specification.***